THE IRON TRADE REVIEW

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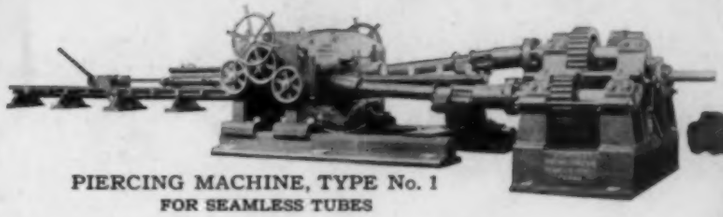

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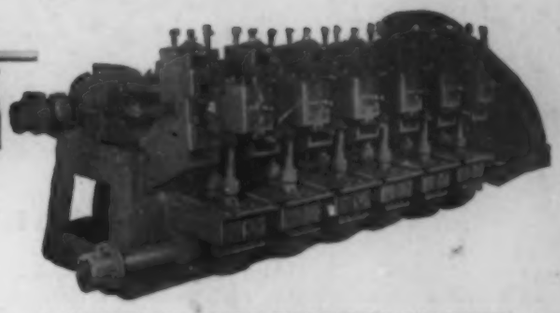

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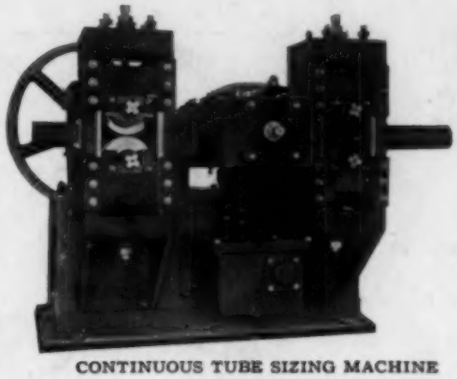

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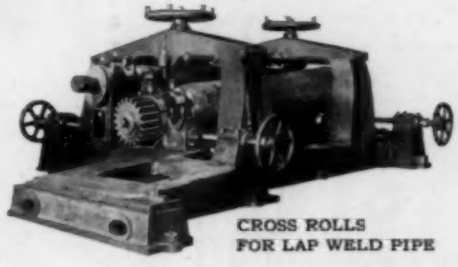

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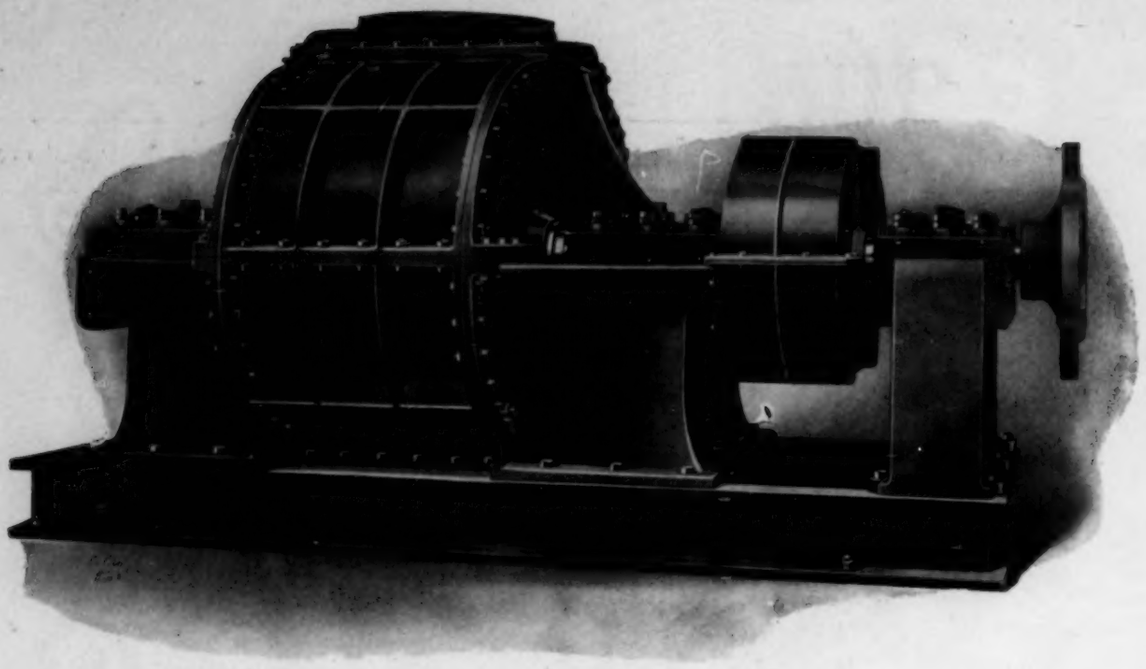

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THE IRON TRADE REVIEW

Vol. LIX Cleveland, October 19, 1916 No. 16

Dollar Ore Advance is Probable

But it May Be More—Car Shortage Very Serious—Pig Iron Buying Active and Prices Higher—Coke is Soaring

RESERVATIONS of great tonnages of iron ore have been made and although no actual sales have been reported, sentiment has been rapidly crystalizing and it seems assured that there will be an advance of at least $1 per ton over this year's prices. There is very strong likelihood of the ore carrying rate from the head of the lakes being advanced 50 cents and ore men feel that owing to this advance and increased costs of mining, an advance of $1 on ore will be reasonable. Buyers have made reservations freely for ore to be taken at the prevailing price, and several firms have recorded reservations of virtually all of their high grade ores. A buying movement may be started at any moment.

Railroad Buying

The American Locomotive Co. has taken an order for 100 small trench locomotives for England and 30 for other nations. Car buying is much more active and large tonnages of steel are now being contracted for, including shapes and plates for 1,500 cars just placed with a Pittsburgh company. Locomotive builders figuring on new orders are inquiring for large tonnages of steel.

Pig Iron

Owing to coke shortage and inability to obtain cars for the delivery of pig iron, blast furnaces have been operating under unusual difficulties, but selling continues at a lively rate and advancing quotations seem to have little, if any, effect in restraining buyers. While the alarm caused by the operations of the German submarine has subsided, an important effect is the heavy increase in insurance rates. The freight on pig iron to Italy now ranges from $30 to $33, while to French ports it is $23 to $25, but active buying for export continues. Holland is still in the market, and has purchased 12,000 tons additional of foundry iron, largely Alabama grades, at $15 to $15.50. The United States Cast Iron Pipe & Foundry Co. has purchased 70,000 tons, largely southern iron, and the southern market is decidedly stronger. The disappearance of the low quotations in the south has had a decided influence in the north, where the upward tendency is marked. The Bethlehem Steel Co. has purchased 10,000 tons of bessemer from a Pennsylvania furnace and continues in the market for an additional tonnage. The United Steel Co., Canton, O., has closed for 5,000 tons of basic. A Pennsylvania furnace has sold 10,000 tons of bessemer to a broker for export.

Wire

The American Steel & Wire Co. and independent manufacturers have advanced prices of wire products $2 per ton. This advance has been expected for several weeks and specifications against contracts have been very heavy. The last previous advance was $2, early in August.

Plates and Shapes

Pressure for delivery of shapes and plates is greater than ever and mills are having very serious trouble in satisfying customers. Some ship building concerns have been compelled to curtail their operations on account of inability to obtain delivery of steel. On marine boiler steel, from 8 to 10 cents per pound is being quoted.

Sheets and Tin Plate

Although the American Sheet & Tin Plate Co. announced a quotation of $5.75 per base box on tin plate, leading independent manufacturers are adhering to their quotation of $6. Following the recent very heavy increase in demand for sheets for export, domestic demand has grown much heavier and sheet manufacturers now have an unprecedented volume of business on their books. Prices are about $5 per ton higher on most gages.

Coke

Sales of Connellsville furnace coke have been made at as high as $5.75 for prompt delivery and a quotation of $6 is expected. Foundry coke is also very high. A limited supply of labor, shortage of cars and increased demand for fuel are responsible for the rapid advance in quotations.

THE OPEN HEARTH

The New Steel Contract

AFTER many years of proclaimed intention and interminable discussion both public and private, the steel manufacturers of this country have stepped upon new ground in the development of a genuine and binding sales contract for their industry. Extended deliberations by the committee on contract obligations of the American Iron and Steel Institute have brought about the draft of a proposed form of contract which is non-cancellable at the option of either the buyer or the seller and this has been ratified by the directors of that organization. The newly-formed association of sheet and tin plate manufacturers, representing an important class of steel buyers as well as steel sellers, has modeled its declaration of principles for the enforcement of contract obligations along the general line laid down in the new form. Wherever the terms and provisions of the recommended instrument have been studied or examined by steel manufacturers, they have met with their approval.

After the respective clauses as to the general agreement; description of the material together with its quantity, quality and time of shipment; the prices; point of delivery and the terms of payment, etc., are set forth in the usual and familiar way, the real essence of the subject is reached. This appears in the sections under the captions "Specifications" and "Special Agreement". It is stipulated that the buyer shall specify completely the tonnage to be delivered under a prevailing contract, on or before the first day of the month preceding that in which shipment is to be made. In other words, the mill must have the order in its hands at least 30 days before delivery begins. In substance, this provision is not exactly new to buyers. Practically similar requirements have been insisted upon by different mills in the past, although the buyers were not obliged to file their specifications at so early a date. It is in the "special agreement" clause that a new trade precedent is introduced in language unmistakably clear and effective in their utterances. Where a buyer fails to send in his specifications which are due by a certain date under the provisions of the clause immediately preceding, this shall be construed as a refusal to accept such tonnage and cancellation of that portion of the total material contracted for shall ensue; furthermore the buyer shall pay to the mill "as liquidated damages and not as a penalty" a sum representing the difference between the contract price of the steel and the market price of the product called for, at the time of the failure to specify. If, on the other hand, the seller has failed to deliver the steel after the buyer has fulfilled all his obligations as to specifying by a certain date, the former shall pay to the customer "as liquidated damages and not as a penalty", the difference between the contract price and the market value of the product at the time the manufacturer has failed to make delivery. In neither case shall the amount of the damages recovered be less than 10 per cent of the contract price.

The vital point of the whole contract lies in this special agreement. If faithfully observed and enforced, it means the end of the archaic and optional contract open at both ends which so long has persisted in steel trading, representing alike a subversive influence upon the stability of that great industry and a standing reproach to the capacity and courage of the business minds that have dictated its policies. What the new contract amounts to as a remedial measure can be determined only by actual performance. That will be its acid test and it cannot be applied during a time as prosperous as that now prevailing, when the dictation of sales conditions is wholly in the power of sellers. The most hopeful feature of the present movement is found in the fact that a concerted effort to eradicate a vicious precedent has been given the official endorsement of so many leaders of the industry.

Metric System Discussion Revived

THE metric system will not down. When the agitation for its adoption by this country seems to be silenced, it is very likely to break out anew, and that is just what is happening at the present time.

Owing to the fact that many American manufacturers during the past two years have become more closely connected with the European nations than ever before and have been compelled in carrying out manufacturing contracts to use the metric system, that standard of weights and measures has become more popular with some manufacturers. This is shown by the results of an inquiry partially reported to date which the Philadelphia Bourse is conducting among large manufacturers and exporting establishments of the Philadelphia district as to the extent to which they are compelled to use the metric system and their attitude toward its general adoption in the United States. Perusal of the replies received by the Bourse does not, however, indicate that there is any general demand, or that any of the manufacturers believe the metric system can be forced upon the American people by congress. The experience of the two years of increased manufacturing for export does not show much increase in the willingness of employes to learn to use the metric system, but the younger men nat-

THE OPEN HEARTH

urally take more kindly than the older employes to the change and we believe the suggestion which has been made that more attention be paid to the system in the public schools, and particularly in continuation schools and technical high schools, is an excellent one.

We are not certain that the Bourse is right when it says that "our system of weights and measures must be all American or all metric", but if the manufacturing of machinery for export is continued after the war to the extent that is hoped, there is bound to be a more extensive use of the metric system and it should receive more attention from the educators of the country. The French units have been legalized by congress and accurate standards have been prepared for distribution. The bureau of standards of the department of commerce is assisting progressive manufacturers in many parts of the country in using the metric system, but it is doubtful whether either congress or any bureau of the government will do any more in this direction unless there is a very strong demand from the manufacturers of the country.

An Indiana preacher recently spent his vacation of six weeks as a laborer in the coke plant of the Indiana Steel Co., at Gary. In an open letter to the company, he states that he went to Gary at least mildly prejudiced gainst the Steel Corporation, but that this prejudice has been to a large extent dissipated by his experience. Certainly he set a fine example of willingness to get the viewpoint of the other fellow and that is a good thing for anybody to do. It usually shows the man who changes his position that the other fellow is not as bad as he is painted.

The Irresponsible Union

THE street railroad strikes in New York City have brought forth some very emphatic declaration in regard to the irresponsibility of labor unions. Receiver Whitridge, of the Third avenue surface line, has declared that to recognize an unincorporated union means making with it a contract destructive of discipline, and he adds that such a union cannot be sued, does not know the nature of a contract and is not straight enough to be willing to keep a contract it has made. The union to which he refers particularly has never published its accounts or made any statement whatever in regard to them.

There is no question about the irresponsibility of most labor unions, but the American Anti-Boycott Association has just called attention to two cases which have important bearing upon the legal responsibility of individual members of labor unions for acts done in their name by their officers. A coal company in Arkansas brought suit against a labor union for treble damages to a large amount, and similar proceedings were instituted by a mining company in Pennsylvania, charging an illegal scheme to prevent the operating of open-shop mines. The Arkansas case was dismissed by one court as not setting forth a good course of action under the Sherman act, but the federal circuit court of appeals has reversed this decision and remanded the case to the district court for trial on its merits, as was done by the Supreme Court in the Danbury hatters' case. This decision clearly shows a tendency to hold unions responsible and, if the courts in general will take this position, the unions will be forced to abide by their contracts or go out of business.

Shall Nations Hate Forever?

LORD BRYCE, English statesman and diplomat, and author of the *American Commonwealth*, one of the very best books ever written by a foreigner on American institutions, has furnished additional evidence that he is a man of brains and courage by his recent address at Birmingham, Eng. After speaking of a possible world movement for guaranty of peace, Lord Bryce turned his attention to the attitude of the belligerents after the end of this war, and said:

"We are justly indignant at the war the enemy powers have waged. We trust that our victory will warn the world that such methods must never be resorted to again, and that those guilty of them will be punished. But is it wise to talk of banning a whole people for all time to come? To indulge in revenge will be to sow the seeds of future wars. Nations cannot hate one another forever, and the sooner they cease to do so, the better for all of them. We must take all proper steps to defend ourselves from any dangers that might arise, if, after the war, the enemy countries were to resume an insidious hostility. But the talk we now hear about starting, after peace has been concluded, a new war of trade to follow the war of arms, has immense capacities for mischief. Such a trade war would prolong, would embitter afresh, those hatreds that ought to be allowed to die, and it assumes a continuance of those very things from which we expect our victory to deliver us once and for all."

Lord Bryce's words are those of a man who, refusing to take part in the clamor for revenge, renders a service not only to the belligerents, but to all nations. Fortunately he is not alone in seeing the dangers of an economic war, but his great prominence will be an important factor in bringing about a rule of reason rather than a rule of hatred in future years.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products October 18, average for September, 1916, average for July, 1916, and average for October, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Oct. 18, 1916.	Aver. for Sept., 1916.	Average for July, 1916.	Aver. for Oct., 1915.
Bessemer pig iron, Pittsburgh	$24.95	$22.20	$21.95	$16.95
Basic pig iron, Pittsburgh	20.95	19.075	18.95	15.95
No. 2 Fdy. pig iron, Pittsburgh	21.95	19.50	19.45	15.57
Northern No. 2, Fdy., Chgo.	19.50	18.65	19.00	14.45
Lake Superior Charcoal, Chgo.	20.75	19.75	19.75	16.25
Malleable, Chgo.	19.50	19.15	19.50	15.12
Southern No. 2, Birmingham	15.50	14.38	14.00	11.75
Southern Ohio No. 2, Ironton	20.00	18.25	18.38	14.88
Basic, eastern Pa.	20.50	20.00	19.00	17.50
No. 2X Virginia furnace	18.00	17.50	18.50	14.00
No. 2X foundry, Philadelphia	20.75	19.75	19.75	16.50
Ferro mang., Balti.	164.00	164.00	172.50	105.00
Bessemer billets, Pbgh.	45.00	45.00	40.00	25.50
Bess. sheet bars, Pbgh.	45.00	45.00	40.00	25.50
Op.-h'th sh. bars, Pbgh.	45.00	45.00	40.00	26.50
Open-hearth billets, Pbgh.	45.00	45.00	40.00	26.50
Steel bars, Chgo.	3.10	2.79	2.69	1.59
Steel bars, Pittsburgh, contr.	2.60	2.60	2.50	1.41
Iron bars, Philadelphia	2.659	2.659	2.559	1.559
Iron bars, Cleveland, local del'y.	2.55	2.40	2.40	1.50

	Prices Oct. 18, 1916.	Aver. for Sept., 1916.	Average for July, 1916.	Aver. for Oct., 1915.
Iron bars, Chgo. mill	$2.35	$2.35	$2.35	$1.37
Beams, Chgo.	3.30	2.79	2.69	1.59
Beams, Pittsburgh, contr.	2.70	2.60	2.50	1.41
Beams, Philadelphia	3.009	2.759	2.659	1.609
Tank plates, Pbgh., contract	3.00	2.95	2.86	1.42
Tank p'ates, Chicago	3.50	3.19	3.09	1.55
Tank plates, Philadelphia	3.909	3.909	3.909	1.609
Sheets, blk., No. 28, Pbgh.	3.40	2.88	2.90	2.05
Sheets, blue an., No. 10, Pbgh.	3.25	2.92	3.00	1.00
Sheets, galv., No. 28, Pbgh.	4.50	4.225	4.37	3.50
Wire nails, Pittsburgh	2.60	2.60	2.50	1.76
Connellsville fur. coke, contr.	3.75	2.48	2.42	2.25
Connellsville fdy. coke, contr.	4.50	3.25	3.15	2.48
Heavy melting steel, Pbgh.	19.00	16.12	16.25	14.00
Heavy melting steel, east'n Pa.	16.00	15.00	15.25	15.00
Heavy melting steel, Chgo.	16.50	15.50	14.15	11.56
No. 1 wrought eastern Pa.	22.00	21.00	19.75	16.00
No. 1 wrought, Chgo.	17.50	16.65	13.95	10.68
Rerolling rails, Chgo.	19.00	16.90	15.70	13.25
Car wheels, Chgo.	12.25	12.00	12.25	11.75

(For Additional Prices See Page 808.)

Pig Iron Buying Defies Obstacles

Difficulties Connected With Foreign and Domestic Transactions Do Not Hamper Business Seriously—Price Tendency is Upward

The United States Cast Iron Pipe & Foundry Co. has purchased 70,000 tons of foundry iron during the past few days. At a meeting of the directors of the company held on Monday, the final purchases were ratified and the company is now covered for its first half requirements.

It is understood that the iron will be furnished by southern furnaces. The iron was taken from several producers and different quotations were obtained. On some of the tonnage, $15 was paid for No. 2 foundry but this figure is believed to have been shaded on a part of the remaining tonnage.

The removal of this large tonnage from the market has strengthened the market in the Alabama district. One producer is now quoting $16 for foundry iron for delivery at any time prior to July 1, 1917, while considerable difficulty would be experienced in buying iron below $15.50. The latter figure is firmly held and the impression is gaining ground that $16 will be the minimum for southern foundry within a short time.

Buying for Export

New York, Oct. 17.—Active buying of iron for export is proceeding, although the difficulties of doing business have been increased because vessel space has become scarce and insurance rates are much higher because of the uncertainties over German submarine operations. Around 5 per cent on insurance has been quoted to the Mediterranean against ¾ to 1¼ per cent before the recent sinking of vessels off the New England coast. Freights to Italy on iron now are from $30 to $33 and to French ports from $23 to $25. Holland continues the most active buyer of foundry iron and during the week took 12,000 tons additional, largely Alabama iron, at from $15 to $15.50, Birmingham, for No. 2. Alabama No. 2 for export at $15 is harder to obtain. One large southern maker asks $16 on basic. A Pennsylvania furnace has sold 10,000 tons of bessemer to a middleman in this territory for export. Another Pennsylvania maker recently closed for 10,000 tons of special bessemer for France at $28, tidewater. A new inquiry calls for 12,000 tons of low phosphorus for Italy. Another for 2,000 tons of foundry for the same country. A Japanese negotiation for 3,000 tons of low phosphorus has been dropped. Domestic business is of only fair volume, but prices continue to rise. Eastern Pennsylvania No. 2X has been sold here at $22, furnace,, or $22.74, tidewater. A sale of 1,000 tons of eastern Pennsylvania No. 2X at $21.50, tidewater, also is noted. A pipe shop and a jobbing foundry in Newark, both bought 1,000 tons each of eastern Pennsylvania foundry. A Connecticut inquiry for 1,000 tons of the same grade, has been closed. Alabama No. 2, under rather special conditions, has been sold in New England at $16, Birmingham. The Buffalo market shows strength. One maker who has disposed of much of a large stock is quoting No. 2X at $20.25. Sales above this figure are reported.

Serious Coke Shortage

Philadelphia, Oct. 16.—Operating problems are occupying the attention of pig iron producers in eastern Pennsylvania district and for the moment the matter of selling has been given a second position. The present difficulties pertain largely to coke where the backwardness of shipments against contracts with the ovens not only has driven a number of consumers into the market for spot fuel at unusually high prices, but has forced no less than five eastern Pennsylvania furnaces to bank at intervals. The result has been not only higher costs but decreased and unsatisfac-

(*For complete prices see page* 808.)

tory production. The uncertainty of the situation has caused various makers to put up their prices to a point above the actual market, as they are not anxious to sell. Even this action, however, has not shut off buying at new top levels. An instance of this is a sale of 2,500 tons of Lehigh valley No. 2X for second quarter of next year to a nearby buyer at $22, furnace. Smaller sales also have been made at the price, which is the highest paid for eastern Pennsylvania foundry iron since the boom of 1907. This sale perhaps is above the market, but at least two makers now are quoting $21 for early and $22 for next year iron. Foundry irons generally are being advanced and the actual market cannot be clearly defined for the moment. Virginia furnaces have done the expected thing in advancing 50 cents to $18, furnace, for No. 2X or $20.75, Philadelphia. Metal has been sold at the new schedule and high manganese Virginia iron has brought $20, furnace. A high silicon Virginia sale at $21.50 is noted. Sales of one Virginia maker since Sept. 1 have been about 40,000 tons.

The Pennsylvania railroad has inquired for 1,000 to 2,000 tons of high manganese and for 500 to 1,000 tons of charcoal iron for the first half. The Standard Cast Iron Pipe & Foundry Co. is out for an indefinite tonnage. The Bethlehem Steel Co. in addition to the inquiry for 15,000 to 20,000 tons of high silicon bessemer put out last week and still pending, has asked for 1,800 tons of foundry iron for Sparrows Point. Basic has shown no inquiry. In low phosphorus, buyers are asking for considerable tonnage, but they are shown more disposition to go slow in closing at the present high prices which on standard remain from $37 to $40, Philadelphia, and on Lebanon iron around $35, furnace.

Prices Advance Further

Pittsburgh, Oct. 17.—Prices of all grades of pig iron are advancing further as demand continues active. Bessemer pig iron is quotable at $24; basic, $20; foundry and malleable, $21 to $22, and gray forge at $21, valley furnace. The Bethlehem Steel Co. has taken 10,000 tons of high-silicon bessemer iron for shipment the remainder of this year from a furnace in this district and likely will buy an additional lot of 10,000 or 15,000 tons. The United Steel Co., Canton, O., closed for 5,000 tons of basic for delivery before Jan. 1, and the Andrews Steel Co., Newport, Ky., has purchased 1,500 tons of bessemer iron. Scattering lots of foundry grades have been sold at about $1 a ton above the price prevailing a week ago.

Exporters of pig iron, who lost their courage Oct. 8, when a German submarine sent to the bottom a half dozen or more ships off the coast of Nantucket, again are figuring in the market, asking bids on rather small tonnages. Great Britain has completed arrangements for paying the insurance rates on about 100,000 tons of bessemer iron, purchased some time ago in the south.

Iron Shortage Appears

Buffalo, Oct. 17.—The sold-up condition of the furnaces of the Buffalo district, the strong inquiry in the market exceeding in tonnage the orders booked; the difficulty of the producers to get out the iron under contract to keep pace with the demands of the melters, the latter caused to a large degree by the shortage of coke, coal, labor and cars, are developing a shortage of iron that is likely to become intensified with the prospective increase in demand on the part of the foundry interests.

Furnaces of the Buffalo district report today that all of these conditions are responsible for the stiffening in prices which has raised schedules to a range of $20 to $22. The lower figure is now the minimum on any grade, and one interest has placed its minimum at $21. Small lot tonnages have been booked in the last 24 hours at $21.50.

Producers report that the indications point strongly to pig iron prices going to a much higher level before the end of the year. One furnace interest reported that the producers for the most part are oversold. Yard stocks and resale iron have been wiped out of the market and can no longer be relied upon to help out the situation. Furnaces are unable to replenish stocks from unsold current capacity.

The sales of the week amounted to 20,000 to 30,000 tons of various grades for deliveries extending over the first half of 1917.

Prices Advanced

Cincinnati, Oct. 16.—A decided advance on pig iron prices has occurred today. Last week two brands of southern furnace iron were being offered at $14.50, Birmingham basis, for No. 2 foundry, for shipment over the last quarter of this year, and one stack sold a small tonnage at the same figure for the first half of next year. Today the only price available for southern No. 2 foundry is $15.50, Birmingham basis, for any delivery up until July, 1917. Southern Ohio iron is very scarce, as all makers in that district have withdrawn from the market. Southern Ohio No. 2 foundry was offered during the latter part of last week at $20 Ironton basis, for the last quarter and the first half of next year, but today no price is available. Southern Ohio bessemer iron, a large tonnage of which has recently been sold for export shipment, is held from $22.50 to $24, furnace, but all stacks are well sold up on this grade. No malleable iron is available in southern Ohio, unless it can be secured from Columbus, O., stacks. Southern Ohio silvery iron is unchanged at $27, furnace, for 8 per cent silicon, and the same grade from the south is being offered from $21 to $22, furnace. Watts iron from the Middlesborough, Ky., stack of the Virginia Iron, Coal & Coke Co. is being offered at $17, furnace, for No. 2X. Virginia iron is quoted at $18, furnace, for No. 2X.

Inquiries here include 6,000 tons of malleable iron from the Link Belt Co., for its Indianapolis plant, for shipment over the first half of next year, 1,500 tons of northern or southern foundry iron from central Ohio, 1,200 tons of foundry iron from Massillon, O., and 750 tons of foundry iron from central Ohio, all for first half shipment. It is reported here that the Ohio Malleable Iron Co., Columbus, O., has closed for 10,000 tons of malleable iron for first half delivery by Columbus stacks.

Basic is Leader

Birmingham, Ala., Oct. 17.—Basic iron continues to occupy the "center of the stage", and some very attractive propositions have been submitted during the past week to induce certain interests of the district to enter upon its manufacture. One company received a firm offer of $16 per ton f. o. b. cars at the furnace for any part of 20,000 to 30,000 tons for shipment over the first half of 1917. Such offers will undoubtedly bring into the market the output of now idle stacks, or else the shifting of more of present foundry stacks onto basic iron. Negotiations are now pending for the blowing in of at least two idle stacks; and it would seem probable that a third will be available after March next year. This refers to the old Trussville stack which is at present subject to redemption by the Gulf States Steel Co. until that time. Should the company not care to exercise its option, no doubt the furnace and property will be taken over by another company and put in shape for operation.

The foundry iron situation has evolved itself into a more or less

(*For complete prices see page* 808.)

sellers' market. That is, the producers in general are not soliciting orders, but taking care of, to the best of their ability, their old customers as they choose to come into the market. One or two of the companies have withdrawn from the market entirely on standard iron and the market is firm.

Chicago Iron Strong

Chicago, Oct. 17.—The pig iron market in Chicago is showing decided indications of increasing strength based on continued demand and steady selling even at the increased quotation put into effect a few days ago. The strength of southern iron is helping the northern market by removing low price competition which has been strong in the past.

Inquiry is being received steadily in good volume. The inquiries do not remain open long and usually are closed in a short time and immediately are succeeded by others. A feature of the present situation is increasing demand for small lots of iron for immediate delivery to fill out present supply for the remainder of the year.

The larger portion of production by northern furnaces for first half of next year is already under contract and the present buying movement, if continued for any length of time, will nearly absorb the entire make for that period.

Strong demand for bessemer iron for export continues and considerable of this product is being shipped east by some Chicago makers. New contracts for this grade are not being made, as the supply of bessemer ore is not sufficient to warrant. Other ores are plentiful and will last through the winter.

An inquiry for 6,000 tons of malleable iron, of which half probably will be charcoal, has been put out by a Chicago machinery maker.

Most southern makers are asking $15.50, Birmingham, for No. 2 foundry, while some who have sold shortly are asking $1 per ton higher for first half. Business occasionally finds a taker at $15, Birmingham, but this is growing scarce. Car shortage has interfered to some extent with shipments and this feature is expected to increase until the end of the year.

Basic Inquiry

St. Louis, Oct. 16.—An inquiry for 10,000 tons of basic iron made its appearance the latter part of last week. This is about the most important matter before the market. While it is not generally known whether northern or southern basic is wanted, it is believed that northern will be the grade desired. Sales last week amounted to 1,200 to 1,500 tons of southern iron and about 400 tons of northern.

Southern iron is held today at $16.50 for next year's delivery and $15.50 to $16 for delivery over the remainder of the present year. Northern iron is quoted at $19.50 to $20, Chicago and Ironton furnaces.

Very Strong at Cleveland

Cleveland, Oct. 17.—The pig iron market is very strong and a sale of 100 tons of No. 2 foundry has been made at $21, valley for shipment to Bedford. One Cleveland firm has sold about 10,000 tons at $20, furnace, for delivery in Cleveland and other points. Foundry iron is scarce and higher prices are confidently expected. For the first time in a long period, an active demand for spot delivery has developed. Steel making irons are also active. One inquiry received in this district is for 10,000 tons of bessemer for delivery at the rate of 1,000 tons a week beginning Nov. 1. This comes from a Cincinnati broker and the iron is for delivery in southern Ohio.

The car shortage is much more serious. Furnaces are having much difficulty in delivering iron to foundries, some of which are in danger of being compelled to shut down.

Bar Tonnage

Is Very Heavy—Mills Take Very Little Tonnage

Pittsburgh, Oct. 17.—Manufacturers of hot rolled products, including plates, shapes and bars, find it increasingly difficult to make desired deliveries. Demand for bars, both for the manufacture of munitions and for domestic purposes, is just about as heavy as it has been at any time the last 12 months. Steel bars continue to be quoted at 2.60c by the Carnegie Steel Co. for delivery at its convenience, but independent makers are asking 2.70c for forward shipment. Iron bars are being held at 2.65c and above, although for spot delivery, as high as 3c is being paid.

Unwilling to Sell

Philadelphia, Oct. 16.—It is manifestly difficult to gage steel bar conditions in this territory since it is only in exceptional cases that makers will agree to accept new business. One maker who had closed its regular trade freely at 2.60c, Pittsburgh, or less, continuing to quote 2.75c, Pittsburgh, but this is not a firm price. Other producers normally are holding for from 2.60c to 2.70c, Pittsburgh. Buyers of small angles in this district have been having much trouble to get the mills to take on their orders, although the specifications and amounts have been attractive. Some of the railroads continue receptive buyers of good bar tonnages on contracts.

Steel Bars Scarce

Chicago, Oct. 17. — The situation in soft steel bars continues most unsatisfactory from the viewpoint of consumers who have not covered their requirements. The leading interest has been taking contracts for indefinite delivery until it seems likely that practically all its tonnage through 1918 has been contracted. The leading independent is fully sold for the first half of next year and has retired from the market for the present on all products.

The quotation remains nominally at 2.79c, Chicago mill, but premiums are being offered for reasonable delivery and any mill in position to take such business can practically command its own price.

Buyers who have not taken their supply regularly from makers, but have "shopped" about from mill to mill during slack periods, are in an embarrassing position, since no maker feels obligated to make a special effort to supply their needs and they are finding it almost imposible to place their business.

Business Declined

Buffalo, Oct. 17.—Mills and agencies report the turning down of tonnages far out of proportion to the business that manages to squeeze its way upon the mill books. Customers of long standing are finding it difficult to get acceptance of a portion of their needs, even subject to delivery at convenience of the mills. Premium prices are being offered but to little avail.

Producers, rather than pointedly refuse consumers that have been on their books for a long period, have in some cases quoted stop-sale prices only to be surprised by having the schedule, put at what appeared to be a prohibitive point, accepted. Bar prices remain rigid at 2.70c.

Chicago Bar Iron Firm

Chicago, Oct. 17. — Most makers of bar iron in the Chicago market are taking contracts from regular customers to cover their requirements for first half. This movement has been going on to a point where most important users are well covered to the middle of next year. Practically no bar iron capacity remains unsold in this district for delivery before the first of next year.

The quotation remains strong at 2.35c, Chicago mill, one important maker being willing to sell at this price to the middle of 1917. Under the heavy selling which has been done during the past

(*For complete prices see page* 808.)

fortnight, it seems likely that an advance to 2.40c or 2.50c, Chicago mill, may be made in a short time. Some makers have been attempting to take business at that level for several weeks.

Shafting Prices Hardening

Pittsburgh, Oct. 17.—Prices of cold rolled steel shafting are hardening and if manufacturers were willing to sell for delivery into the second quarter of next year, they likely could get 10 per cent or more off the list. That figure is being quoted more frequently, but the 20 per cent off the list price has not entirely disappeared. Manufacturers of shafting appear to be selling cautiously, apparently believing that higher prices are in store for them next year.

Warehouse Prices

Are Advanced at Chicago on Sheets and Rivets

Chicago, Oct. 17.—Some increases in quotations have been made by Chicago warehouses, although plates, shapes and bars remain at former figures. No. 10 gage blue annealed sheets have been advanced $2 per ton to 3.50c and No. 28 gage black sheets have been advanced $4 per ton to 3.55c, Chicago store. Quotations at St. Louis and St. Paul are correspondingly higher.

The rivet situation is becoming decidedly stronger and structural rivets are now quoted at 4.25c, Chicago, with boiler rivets at 4.35c, Chicago.

Youngstown Men Resign

Youngstown, O., Oct. 14.—Changes affecting the boards of directors of the Youngstown Sheet & Tube Co., Brier Hill Steel Co. and Youngstown Iron & Steel Co., were made here Saturday, to conform with the Clayton law. Henry H. Stambaugh leaves the advisory board of the Sheet & Tube company to continue as chairman of the Brier Hill Steel Co. board. J. G. Butler Jr., vice president of the Brier Hill Steel Co. and a director of the Youngstown Sheet & Tube Co., has not been heard of in the matter, not having returned yet from Europe. James A. Campbell leaves the managing board of the Lackawanna Steel Co. to continue as president of the Youngstown Sheet & Tube Co. Attorney C. D. Hine leaves the Sheet & Tube company to remain a director of the Youngstown Iron & Steel Co. E. L. Ford leaves the advisory board of the Brier Hill Steel Co. to continue a director of the Youngstown Sheet & Tube Co.

Ship Steel is Advancing

And Some Foreign Buyers Object, But Active Inquiry from Home and Abroad Continues

Philadelphia, Oct. 16.—Steady piling up of shipbuilding requirements both at home and abroad and the incessant flow of the latter into the market continue to make ship steel the strongest element of the eastern plate market. For ship plates, Lloyds specifications, eastern mills now are naming up to 4.50c, Pittsburgh, and have obtained it in instances. Some foreign buyers, notably Japanese yards, have been offering the top figure, as recently noted. The ship steel market still is rising and practically no eastern mill will accept less than 4c, Pittsburgh. For marine boiler steel, 8c to 10c, Pittsburgh, is ruling and one maker reports he has been fairly overwhelmed by orders even at such a price. One mill booked an additional order for 6,000 tons of ship plates from the Pacific coast for 1917 delivery and another lot of 2,800 tons. English buyers have begun to intimate to some of the mills that they expect to be more independent of American supplies in the near future and that they do not intend to continue to pay the high prices quoted on this side. These declarations, however, do not square with the reports of severe steel shortage in the British Isles which steel men lately have brought back. Likewise it is significant that the British government through J. P. Morgan & Co. has come out as a direct buyer of ship plates and has asked for 2,000 to 3,000 tons. This is believed to be only a test inquiry. Another British inquiry for 25,000 tons still remains open.

Pacific Builders Seek Tonnage

Pacific coast shipyards this week again sought a round tonnage in the east, some for Vancouver for 1917. Tank plates are not so firm and one maker who has been asking 4.00c, Pittsburgh, has accepted business at 3.75c as his bookings at the former schedule were limited and he was undersold repeatedly since some mills have quoted 3.50c freely. On the other hand, another mill reports sales of small lots of prompt tank and flanged steel at 6.00c, Pittsburgh. A Pittsburgh district maker has been booking some last quarter contracts for boiler steel in this district at 3.25c, Pittsburgh. Universal plates remain irregular and comparatively inactive. Eastern mills have quoted 3.25c, Pittsburgh. A car builder is in the market for 6,000 tons of plates.

Demand Heavy

Pittsburgh, Oct. 17.—Extensive car building programs of railroads in the east, central west and west call for a tremendous tonnage of material. A number of important contracts have been placed this week, although details of these transactions have not become known generally. The ship building industry has created further demand for steel plates and shapes. The Carnegie Steel Co. has taken 14,000 tons for a merchant ship to be built at Seattle in 1918. Plate manufacturers have enough tonnage on their books to keep plants operating at maximum capacity well into the second half of next year. For delivery at their convenience, mills are asking from 3c to 3.25c; for prompt shipment, 3.50c to 4c is being quoted.

Plates Sold Far Ahead

Chicago, Oct. 17.—Demand for plates continues strong and with the revival of car buying a large tonnage of plates and other steel products has come into the market. Larger steel companies have made important reservations covering contracts now pending and it is believed that if all these contracts develop they will take almost the entire remainder of the plate output of important plate makers for the year 1917. The nominal quotation on plates is 3.19c, Chicago mill, but heavy premiums are being paid and 4.19c, Chicago, has been done on a number of sales.

Operations Curtailed

Cleveland, Oct. 17.—Inability to obtain delivery of plates has become very serious. One large user is now operating at only 50 per cent of its capacity on account of not being able to obtain deliveries. One Cleveland company which has been quoting from 3.25c to 3.50c is now quoting a minimum of 3.50c, and is quoting the same price on No. 10 black sheets. Eastern mills which have been able to give fairly prompt delivery on sheared plates at 3.50c, Pittsburgh, have advanced to 3.75c. One eastern mill is quoting 8c, Pittsburgh, for 8 months' delivery on boiler steel, which is very hard to get at any price for prompt delivery.

Federal Judge Killits, of Toledo, has given Walter L. Ross, receiver of the Clover Leaf railroad, permission to buy five locomotives.

(For complete prices see page 808.)

Sheet Orders Come With Rush

Tremendous Volume of Business—Domestic Buying is Heavy, Following Recent Increase in Activity of Foreign Consumers

Youngstown, O., Oct. 17.—Sheet producers, after months of comparative dullness, are engulfed in the greatest flood of business any of them has ever known. The buying movement that got under way slowly in early September, has gained force steadily in succeeding weeks and during the last 10 days has reached proportions far beyond the hopes of the most optimistic sales manager.

The heavy export sales, which as pointed out last week, had the more important influence in strengthening prices in the past few weeks, are now paralleled by the heaviest volume of inquiry on record from domestic consumers. With both export and domestic business at a record-breaking level, the market is gaining strength daily.

One sales manager pointed out that his home office force was kept busy answering telegrams. Inquiries involving 5,000 tons are growing common. One export inquiry received this week contained 20 pages of specifications on which quotations were asked.

Prices are firm. The 3.40c minimum on black sheets announced last week by the American Sheet & Tin Plate Co. is firmly established in the valleys. Most of the mills are well sold up for the present quarter, but one big producer has been taking considerable business at 3.40c in the past few days. Some mills with restricted tonnages for early delivery are asking high prices and 3.75c has been secured. One lot of 600 tons, of which the smallest specification was 50 tons, was sold at 3.75c yesterday.

Mills are not pushing 1917 sales, although orders for that delivery are being entered. Within the next few weeks practically all the mills will be selling for first quarter delivery, but there is a tendency now to go slowly on forward business. The mills could easily sell out for first quarter within a few days if business was accepted as offered.

Automobile manufacturers are especially anxious to buy sheets. In Detroit, one automobile builder lost two days last week, another the full week, while a third is unable to finish 5,000 cars, all through a lack of sheets.

The market for galvanized sheets also is strong. The 4.50c minimum announced by the American Sheet & Tin Plate Co. is freely disregarded. One mill has been quoting 5c on the coated stock for some days, while another has advanced its price to that level. This mill during the past two weeks has advanced its price almost daily from 4.40c to 5c, and each raise was met by a renewal of insistent inquiries. Few mills have galvanized tonnage to sell for delivery this quarter.

Blue annealed sheets likewise are beginning to strengthen. One mill has been quoting 3.15c, but in all other cases 3.25c is the minimum. An increase in producing capacity in recent months has made the competition for blue annealed sheets more keen recently and has retarded its advance in price. One buyer is understood to have taken 600 tons at 3.20c this week.

Disturbing factors in the market, from the sheet producer's viewpoint, are the questions of securing sufficient steel, fuel and cars. Sheet bar deliveries in some cases are not sufficient to permit maximum operations. Coal has advanced in price and deliveries are uncertain. One mill today received six carloads of coal in box cars. The car situation is acute and is retarding shipments.

Books for First Half Opened

Pittsburgh, Oct. 17.—The American Sheet & Tin Plate Co. last Thursday opened its books to manufacturers for shipment the first half of 1917 and to jobbers for first quarter shipment; advanced its prices of steel sheets about $5 a ton and made a number of interesting changes in its price differentials for blue annealed products. Sheets now are quoted as follows: Galvanized, 4.50c; black, 3.40c; blue annealed, 3.25c. Blue annealed sheets from No. 3 to No. 12 gage are quoted on a flat price; gages ranging from No. 13 to 16 in the blue annealed classification hereafter will be sold on the basis of bessemer black sheets. For several months, some mills had been quoting on the classification that netted them the most attractive prices. Customary differentials on the various gages of black and galvanized sheets are maintained by the American company, with the exception of gages Nos. 29 and 30 in the coated sheets. These gages now are quoted 30c and 40c above the base, instead of 15c and 30c, the old differential.

Pressure for all steel products is heavy. Some mills virtually have withdrawn from the market for delivery the remainder of the year and none of the mills is selling galvanized sheets for shipment after March 31. Domestic activity has been augmented to a considerable extent by foreign demand. England, Japan and several South American countries have been active factors in the market and considerable tonnage in the aggregate has been sold for export.

Foreigners Buy Sheets

Philadelphia, Oct. 16.—An active demand for blue annealed sheets for export has developed from such countries as France, Italy and Japan, and eastern Pennsylvania makers during the week closed some fair business in that direction. In some cases, the prices obtained were higher than the domestic range of 3c to 3.25c, Pittsburgh, for No. 10 gage. There also has been livelier buying by domestic users and contracts for the first quarter are being closed.

Tin Plate Price

Named by American Company Lower Than That of Independents

Pittsburgh, Oct. 17.—The American Sheet & Tin Plate Co. last Thursday opened its books for first half shipment to consumers of tin plate, at $5.75, base, for 14 x 20, prime western coke, 100 pounds f. o. b. mill, or 25 cents a box below the price announced, Oct. 6, by the Phillips Sheet & Tin Plate Co. and a number of other independent concerns. Since the American company did not adopt a price as high as that made by several other concerns, numerous contracts for tin plate have been rewritten on the basis of $5.75, base. While several of the larger independent concerns say they will adhere strictly to the $6 quotation, it is only natural to assume that old customers will cover requirements for the first and second quarters at the lowest price named by representative factors in the tin plate industry.

On Nov. 11, 1915, the American company made a price of $3.60, base, for shipment in the 1916 season. Its price today is $2.15 a box above the price at which the market opened 11 months ago. The $5.75 price is the highest at which any season ever

opened in the history of American sheet and tin plate manufacture; the nearest approach to it was the price of $4.65, named Aug. 6, 1899. A month ago, it was believed that the price of tin plate for the 1917 season would be $5; a fortnight ago, most people guessed that at least as high as $5.50 would be asked. Although the $6 price did not cause much surprise, some manufacturers and consumers seemed to have had an inkling that the American company would not ask a figure as high as that adopted by the independents.

For roofing ternes, the American company made a price of $4.90, I. C. base, and that figure now represents the market. The market for tin plate is quotable at a range from $5.75 to $6. Demand for tin plate is so heavy that manufacturers have found it necessary to allot tonnages, and consumers have been compelled to guarantee that they will specify fully against contracts.

As pointed out a week ago, bessemer sheet bars were quoted at $27, open-hearth sheet bars at $28 and tin at a range from 38c to 39c, when the American company opened its books for 1916 delivery. Last Thursday, sheet bars were selling at a range from $45 to $50, mill, and tin nominally was quoted at 42½c for spot delivery.

Holding for $6

Cleveland, Oct. 17. — Although the American Sheet & Tin Plate Co. is quoting $5.75 per base box on tin plate, leading independents continue to adhere to the $6 quotation. An inquiry for 20,000 boxes is pending and the outlook is that the buyer will not be able to place the order at less than $6.

Shape Delivery Slow

Mills Have Much Trouble in Meeting Demands of Buyers—Prices Advanced in the East

Philadelphia, Oct. 16.—All the eastern Pennsylvania manufacturers of structural shapes now have advanced to 2.85c, Pittsburgh, or 3.009c, Philadelphia, and they are able to put through some business on this level. There is an inquiry pending for about 1,000 tons, on which a western buyer has offered 2.85c for delivery beginning Jan. 1. Ship channels and angles, in view of the large demand from the ship yards, now are being quoted by some makers at 3.50c, Pittsburgh. The problem with some of the eastern shape makers is how to apportion their tonnage during the next few months either as to new sales or specifications, as buyers are drawing heavily upon contracts and mill obligations steadily are piling up above shipments. The Westinghouse interests have decided to defer until next spring their 6,000-ton new plant project at Essington, Pa., upon which bids recently were asked.

September Awards

New York, Oct. 17. — September's showing of total structural awards was comparatively light representing approximately 99,000 tons, compared with 112,500 tons during August, according to the monthly announcement of the Bridge Builders' and Structural Society. The percentage of shop capacity contracted for in September was 52½ compared with 64 in August; 47½ in July; 58 in June and 80 in May.

The monthly statistics of the Bridge Builders' and Structural Society, showing the percentage of capacity contracted for and the approximate tonnage reported, are as follows:

Month.	Per cent.	Approx. tonnage.
September, 1916	52½	99,000
August	64	110,000
July	47½	83,600
June	58	100,000
May	80	137,000
April	72½	125,000
March	102	175,500
February	75	129,000
January	69	119,000
December, 1915	121	208,000
November	105	180,000
October	78	135,000
September	67	115,000
August	85	146,000
July	86	148,000
June	80	138,000
May	61	105,000
April	62½	107,500
March	64	110,000
February	30	51,000
January	25	43,000
December, 1914	35	60,000
November	20	35,000
October	35	60,000
September	38½	65,000
August	27½	48,000

New business in fabricated lines has been quieter the past week. Some of the shops, especially those connected with the mills, are not actively seeking business. A liberal amount of railroad work remains pending and this represents the major part of the going business. Plain material prices are strong at a range of 2.70c to 2.85c, Pittsburgh, or 2.869c to 8.019c, New York.

Busy Fabricators Want Steel

Pittsburgh, Oct. 17.—Fabricating interests throughout the country are urging mills for shipment more vigorously than ever. Deliveries, in many instances, are deferred six months. For shipment at their convenience, mills are asking 2.70c for structural shapes. For delivery in from 60 to 90 days, one mill is asking 2.85c. The American Bridge Co. has taken 900 tons for a Masonic temple at Cleveland.

Mills are Filled

Cleveland, Oct. 17. — The principal shape mills are so filled up with orders that they are very slow to take on additional tonnage, but structural shops are not very busy and are finding business conditions very unsatisfactory on account of the slow delivery of steel. The Dyer Co., builder of beet sugar mills, is in the market for 340 tons of shapes for a plant for the Great Western Sugar Co., in Colorado.

Steady Shape Demand

Chicago, Oct. 17.—Western fabricators find a continued demand for structural material, mostly for railroad, industrial and bridge purposes. The quotation on structural material is firm and strong at 2.89c, Chicago mill.

The largest tonnage placed in the west recently involves 3,200 tons for additions to the Hawthorn plant of the Western Electric Co., at Chicago, which will be fabricated by the American Bridge Co.

Other tonnages are comparatively small and are well scattered over western territory.

CONTRACTS AWARDED.

Western Electric Co., additional buildings for Hawthorne plant, Chicago, Ill., 3,200 tons, to American Bridge Co.

Bowman Dairy Co., office building, Chicago, 574 tons, to Vierling Steel Co.

George Gorton Machine Co., machine shop at Racine, Wis., 264 tons, to Green Engineering Co.

Pima county, Arizona, two highway bridges, 250 tons, to Midland Bridge Co.

Oliver Iron Mining Co., shaft sets for Aurora mine, Ironwood, Mich., 229 tons, to American Bridge Co.

Pantages Theater Co., theater and office building, Tacoma, Wash., 208 tons, to Minneapolis Steel & Machinery Co.

Masonic temple, Cleveland, 900 tons, to American Bridge Co.

Bridge work for the Baltimore & Ohio railroad, 500 tons, to the Fort Pitt Bridge Works.

Bridge work for the Pennsylvania railroad, 2,000 tons, to an independent shop.

Turbine foundation for the Public Service Corporation, Newark, 250 tons, to the Hay Foundry & Iron Works.

CONTRACTS PENDING.

Rebuilding eight grade crossing viaducts, Buffalo, low bidder on seven of the jobs, taking 1,000 tons structural and 1,000 to 1,200 tons cast iron plates, Strobel Construction Co., Chicago. City to award contracts later.

New plant for the Westinghouse Electric & Mfg. Co., Essington, Pa., 6,000 tons, action deferred until spring.

Car repair shops for the Southern railway, Spencer, N. C., 500 tons, bids being taken.

The Carnegie Steel Co. has completed plans for a new bar and billet mill at the works at Farrell, Pa.

(*For complete prices see page* 808.)

Very High Coke Prices

Increased Demand, Car Shortage and Lack of Laborers Are Important Factors in an Unusual Situation

Pittsburgh, Oct. 17.—Connellsville blast furnace coke, both for spot and future delivery, has swung into the "war bride" classification this week. As high as $5.25 and even $5.50 a ton has been paid for immediate shipment and coke for delivery next year has been sold at $3.75 and $4, ovens. The Donner Steel Co., Buffalo, is understood to have closed for 14,000 tons a month for delivery the first three months and for 30,000 tons a month for shipment the last nine months of 1917, at $3, ovens. A couple of blast furnace interests in the valley have purchased about 35,000 tons a month at $3.75, ovens, for delivery the first and second quarter of next year. One valley interest is reported to have paid $4, ovens, for similar shipment. Demand for contract coke is heavy, but pending inquiries are being rather closely guarded.

As pointed out in these columns previously, Connellsville coke reflects strength for several reasons. Demand at present exceeds the supply of available standard coke; the bituminous coal market, abnormally strong, has tended to boost prices of Connellsville coke, and the car situation has contributed to complicate the entire situation. Foundry coke has not yet joined the march toward higher price levels. By-product coke oven plants throughout the country are offering some cupola fuel and this has tended to relieve the situation considerably. On the other hand, the Bethlehem Steel Co., which obtains the output of the Lehigh Coke Co., a by-product interest, has been buying beehive oven coke for immediate delivery. *The Connellsville Courier* for the week ending Oct. 7, says production was 416,126 tons, compared with 412,364 tons the week before.

Becoming Scarce

Chicago, Oct. 17.—Although most contracts for coke, both beehive and by-product, are made July 1, a number of important users have contracts expiring Jan. 1, and are now sounding the market for a supply from that date. While Connellsville coke is being quoted at $4 and higher at the ovens, a large seller of by-product coke in this territory is willing to cover contracts from regular customers at $3.50, Connellsville, and an interesting situation is developing. One factor in the coke market which is of great importance here is the difficulty of shipping this material during the present acute car shortage. The most strenuous efforts to keep shipments moving in sufficient volume have not availed to avoid some shortage and the situation appears to be growing worse instead of better.

The consumer who is most in distress is the one who has followed the custom previously of buying wherever his own interest seemed best served and has never been a regular customer of any seller. In the present situation, he finds himself without a friend and coke dealers who are unable to supply the needs of their regular customers will not entertain his inquiry.

Furnace Coke Sales

Philadelphia, Oct. 17.—A sale of several cars of spot Connellsville furnace coke was made to an eastern Pennsylvania furnace this week at the unprecedented price of $5, ovens. There also have been sales at from $4.50 to $4.75, ovens. Spot coke is exceedingly scarce. This has resulted in purchases in some cases of spot foundry coke by the furnaces. A sale at $4.65, Connellsville ovens, of this kind, is noted. Not less than five eastern Pennsylvania furnaces are continuing to be forced to bank from time to time because of the non-arrival of coke against contracts. There is much complaint among consumers over the backwardness of some producers in filling their contracts. Some negotiations for new contracts are under way.

Wellston Company Buys

Cincinnati, Oct. 16.—A Wellston, O., furnace company has closed for 30,000 tons of coke for shipment over the first half of next year. Southern furnace grades are very strong, and have advanced sharply. Wise County and Pocahontas furnace coke are quoted from $3.25 to $3.75, ovens, and New River furnace coke from $3.50 to $4, ovens. Furnace coke is scarce and dealers report that they have been unable to quote on several inquiries. Wise County and Pocahontas foundry coke are quoted from $3.75 to $4.25, ovens.

By-Product Activity

St. Louis, Oct. 16.—An inquiry is out in this market for 5,000 tons of by-product coke for delivery up to Jan. 1, and smaller inquiries amounting in all to about 1,000 tons, also have made their appearance. By-product coke, which is used almost exclusively in this market, is held at $7 a ton for spot delivery, with very few bids being made on contracts. Connellsville foundry grades are held at $4.50 to $5, ovens.

Serious Car Shortage

Cleveland, Oct. 17.—Both furnace and foundry coke for prompt delivery have been sold at $5 a ton, ovens. The car shortage continues very serious and evidently is getting worse all the time.

(*For complete prices see page* 808.)

Bessemer Ore

Sold at Advance of 75 Cents—Heavy October Shipments

Philadelphia, Oct. 17. — Additional sales of about 50,000 tons of old range ore for delivery by Jan. 1, have been made to eastern Pennsylvania furnaces at different prices. The bessemer ore was sold at $5.20, at lower lake ports, an advance of 75 cents over the present season's schedule. The non-bessemer ore brought $4, at lower lake ports, an advance of 30 cents. Some old range bessemer still is being offered. Eastern furnaces recently have purchased five or six cargoes of Spanish, Lucainena, low phosphorus ore on an advancing scale of prices. The last transactions are understood to have been at from 13 to 14 cents, per unit of iron at tidewater.

Heavy Shipments

Cleveland, Oct. 17.—Shipments of iron ore from the Lake Superior region during the first half of October were at a record-breaking rate for this time of the year and although weather the first two days of this week was somewhat stormy, there was only a slight interruption of shipments and the outlook is that the movement for the month will be between 8,500,000 and 9,000,000 tons which will, of course, be a record for October.

Cold Rolled Strip Steel

Pittsburgh, Oct. 17.—Reports that mills had opened their books for delivery next year are denied by leading manufacturers of cold rolled strip steel in this district. While much of the tonnage now on order books will not be shipped until some time after Dec. 31, next, manufacturers have not formally opened books for delivery after that date. Mills are asking from 6c to 6.50c for shipment at their convenience.

The Valley Forging Co., Verona, Pa., has purchased a site, 120 x 312 feet, adjoining the works of the company, and will extend its manufacturing facilities at an early date.

Chicago Scrap is Rising

And Prices Have Begun to Move Upward at Cincinnati—Somewhat Easier Conditions at Cleveland

Chicago, Oct. 17.—In spite of the fact that scrap quotations have been at a high point for some time, advances are still being made and the only limit seems to be the price of pig iron. At some point the relation between these two products probably will stop the advance of scrap unless pig iron goes higher and gives opportunity for scrap to follow.

The present level of quotations is practically the highest that has been reached since the beginning of the European war and signs point to even higher quotations being made. Dealers are sanguine that any increase in demand will bring about an immediate shortage sufficient to call for higher prices.

Railroad offerings this week are unusually small and result from the custom followed by most roads of offering their scrap at the beginning or end of the month rather than at the middle. The Chicago, St. Paul, Minneapolis & Omaha railroad offers 160 tons, the Chicago, Peoria & St. Louis railroad 225 tons and the Pullman Co. 150 tons.

Prices Advancing

Cincinnati, Oct. 16.—The scrap market is finally coming into its own. Following several weeks of activity and strength, prices have begun to advance, and the outlook is that higher figures will be realized next week. Demand is good, and dealers report that inquiries are being received from all parts of this and adjacent territories. A large amount of heavy steel scrap has been sold during the past few days to Canton, O., users. All forms of steel scrap have advanced, heavy melting scrap being now quoted from $15 to $15.50 per gross ton, and old iron rails from $17.50 to $18 per gross ton. Slight advances have also been realized on bundled sheet scrap, stove plate, and No. 1 railroad wrought, the latter being quoted from $14 to $14.50 per net ton.

Going Higher

Pittsburgh, Oct. 17.—The market for iron and steel scrap, which came into its own several weeks ago, continues to reflect strength. Heavy melting steel has sold at as high as $19 a ton, delivered, and none of the larger dealers appear willing to shade that figure. In fact, as high as $19.50 frequently is being quoted. The independent mills have been buying actively, but subsidiaries of the Corporation have not been covering future needs, despite contrary reports. Fortunately all grades of scrap are plentiful, but dealers are not sacrificing prices to move tonnages. All grades have advanced from 50 cents to $1 a ton this week.

Easier at Cleveland

Cleveland, Oct. 17.—The past week has witnessed a slight decline in heavy melting steel, as the market became easy for buying, and prices are lending to softness. Purchases in the last buying movement were hardly more than 7,000 to 10,000 from local middlemen and dealers, but no figures are available from the railroads which also sold scrap to local mills. With this relatively small purchase, it is evident the present decline will have an early termination, judged from the influence speculative actions may have on the present situation.

Iron and steel axles have sold at $39 a gross ton, f. o. b. this city, for export shipment. Malleable iron scrap, quoted at $15 to $15.50 gross, has shown no change over the past two weeks. Machine cast is moving freely, but not in sufficient volume to stiffen the price at this time. No. 1 railroad wrought and bundled sheet scrap are without a definite market. Cast borings are fairly strong at quoted prices, but machine shop turnings continue to be heavy. The price of No. 1 busheling scrap has softened to $13.50 and $13.75, which is still below the customary value of this grade of material.

Advanced at Buffalo

Buffalo, Oct. 17.—Heavy melting steel advanced another $1 a ton today and is now quoted at $18 to $18.50. Dealers are making but few sales for immediate delivery and decline to book large tonnages at the new schedule. Yards report a scarcity of the better grades of steel scrap. The demand for low phosphorus scrap is strong and an increase in price is in sight. There is also a good demand for machine shop turnings at $7 to $7.50; cast iron borings at $8 to $8.25 and wrought pipe at $13 to $13.50.

Steel Scrap Backward

Philadelphia, Oct. 16.—Steel scrap remains the backward member of the market as far as the buying by eastern consumers goes. There is very little of such business now being done and the brokers are making the market by their purchases mainly for Pittsburgh delivery. They are reported to have paid $18.50, delivered, which is equivalent to about $16, Philadelphia, and to $16.50, delivered to the eastern Pennsylvania works. Wrought scrap buying continues and stove plate is more active. Rerolling rails are in demand and are scarce. Low phosphorus scrap also is commanding good prices, but is being offered only sparingly.

Still Advancing

St. Louis, Oct. 17.—Prices of scrap continue to advance in this market, notwithstanding some unusually heavy offerings by the railroads last week, which tonnages were absorbed readily. The opinion seems to be more definite that a shortage of considerable proportions really exists. Consumers are anxious to close for large tonnages at prevailing prices, while dealers are dubious about selling at the present time. Standard section relaying rails are advancing rapidly in price, owing to heavy inquiries and limited supply. The only railroad offerings before the market this week are: Chicago, Peoria & St. Louis, 250 tons; Chicago, St. Paul, Minneapolis & Omaha, 300 tons.

Strong in South

Birmingham, Ala., Oct. 17.—Every grade of scrap continues to show strength in the southern market. Dealers have recently made some heavy purchases of railroad and saw mill scrap, accumulations of several months, and are making sales in direct carload lots by properly sorting the scrap at point of loading instead of rehandling in yards. The market is active from the standpoint of both buyers and sellers, and great scarcity of certain material is felt, especially steel and wrought.

Better Tone

New York, Oct. 17.—Influences from the Pittsburgh district remain the most potent factor in giving the scrap market in this territory a better tone, especially in heavy melting steel. Up to $15.40, New York, has been offered for steel for Pittsburgh delivery. There are rumors here that as high as $19, delivered, has been obtained in the Pittsburgh district by local sellers. Eastern steel works remain out of the market, but one of them has intimated it might be interested at $16, delivered. A large eastern Pennsylvania Steel Co. is buying clean cast borings at $9, delivered. The demand for wrought pipe continues good. A lot of 1,000 tons of car wheels is being offered here and the best price obtainable has been $15.50, delivered eastern Pennsylvania.

(*For complete prices see page* 808.)

Billet Prices

Are Objected to by Some Foreign Buyers—Supply Limited.

Philadelphia, Oct. 16.—Some foreign buyers, especially in England, who have been getting liberal tonnages of material in this country are demurring more plainly against paying present prices for billets and other lines and state they expect they will be able to satisfy their needs at home before many months. Their declarations are not being taken very seriously by makers. These foreign inquiries still appear liberally. One proposition now pending is for 20,000 tons of soft steel billets for England. Eastern makers are quoting both for home and export from $50 to $55, mill, for open hearth rerolling and $65 and upward for forging billets. On wire rods for export, $65, Baltimore, has been asked. The two leading eastern sellers of billets can offer no new contracts before the third quarter. The domestic demand is good and some steel makers in the middle west have been endeavoring to get material in the east. Eastern makers are offering shell bloom discards in lots of 500 to 1,000 tons each at from $35 to $40, mill. A lot of bessemer billets of irregular lengths was sold here by an Ohio maker at $45, mill. Bids have been taken by the Frankford Arsenal on 205,800 3-inch shells, but no award has been made and bids have been asked on 93,333 4.7-inch shells.

Rather Quiet

Pittsburgh, Oct. 17.—Semi-finished steel products are not nearly so active as they were a few weeks ago, but this is not surprising, in view of the fact that most consumers have covered requirements for the remainder of the year. Billets and sheet bars for prompt shipments are just about as scarce as hen's teeth, although reports of an occasional sale at a premium price are heard. Mills continue to ask from $45 to $50 for both billets and sheet bars. Muck bar is held at $45 and wire rods from $55 to $60, Pittsburgh.

Sheet Bar Advance Expected

Youngstown, O., Oct. 17.—Local mills have received offers of $50 for sheet bars from a domestic consumer during the past few days. No business was taken, however, as the mills are sold out during the rest of this quarter. Information has also been received here that another sheet mill is inquiring for 20,000 tons of sheet bars for first and second quarter delivery, and is seeking assurance that tonnage will be held open for its third quarter needs. This sheet producer, in the past, has received the bulk of its steel from one steelmaker. The fact that a general inquiry has been distributed to steel producers indicates the difficulties faced by steelmakers in meeting the maximum requirements now being specified. The increasing strength of the sheet market has widened the margin between the cost line and selling price of sheets and steel mills are forecasting an advance, probably to $50, for first quarter sheet bars.

Domestic Ferro

Is Being More Freely Sold—Carnegie Steel Co. is a Seller.

New York, Oct. 17.—Offerings of ferro-manganese have increased considerably during the past week or two, and the market is reflecting this fact through a greater irregularity in prices. The augmented tonnage in the market has come mainly from domestic sources and it has included the product of some of the steel companies which have been making this alloy, principally for their own use. The Carnegie Steel Co. has been offering some metal from a surplus caused by the putting of an additional furnace on this alloy and a large eastern Pennsylvania plant also has been more active as a seller. As to foreign metal, the English makers have not been offering any more liberally than in the recent past, but Indian ferro-manganese has been disposed of by middlemen and a second shipment now is afloat. This ferro-manganese runs about 73 per cent, as stated previously, and is being offered at $2 per unit, or somewhat under the English schedule of $164, seaboard. The price range on domestic ferro is approximately from $162 to $166, delivered. Sometimes resale lots are being marketed at less. There have been first-half sales made by one of the steel works producers at $162, delivered to nearby consumers. The market shows a fair amount of business being done in a miscellaneous way. Advices from English producers to their agents in this country are to the effect that shipments against contracts will be more liberal from this time on. The explanation of this, apparently, is that the higher-priced contracts closed several months back at from $175 to $200, seaboard, now are coming into effect.

Spiegeleisen continues to be sold in moderate lots at a market range of $40 to $45, furnace. It is believed that little 18 to 20 per cent metal now is available under $43, furnace. There are reports that some quotations considerably under $100, Pittsburgh, for 50 per cent ferro-silicon recently adopted by domestic makers, still are outstanding.

Manganese Ore Sold

Philadelphia, Oct. 17.—Two additional cargoes of Brazilian manganese ore have been sold to manufacturers of ferro-manganese in this country. The prices obtained are understood to have been about 70 cents per unit of manganese at tidewater.

Easier at Pittsburgh

Pittsburgh, Oct. 17.—The situation for ferro-alloys, particularly ferro-manganese, is not so tight as it was a few weeks ago. Domestic makers are understood to be offering some tonnage for delivery next year. While it is not known exactly what price domestic makers are quoting, it is believed that some domestic tonnage has been sold at less than the general asking price for foreign ferro-manganese, which is being held at $164 and $165, seaboard. No large tonnages have been sold in the open market here. Several sellers of 50 per cent ferro-silicon are asking $100, Pittsburgh, for this material. Spiegeleisen continues to be held at $45, furnace, by at least one concern, but sales at $40, furnace, are noted.

Some sellers of lower grades of ferro-silicon have advanced prices $2 a ton for shipment next year, and are now asking $33 for 10 per cent. Demand for lower grades has been heavy for several weeks and most furnaces virtually have withdrawn from the market for first quarter delivery.

Nuts, Bolts and Rivets

Pittsburgh, Oct. 17.—Demand for nuts, bolts and rivets continues very heavy and it is likely that prices will be put up at an early date. For anything like prompt shipment, makers are asking premiums amounting to several dollars a ton. Foreign countries continue to play a prominent part in the market.

Date Advanced

Washington, Oct. 17.—The Supreme Court of the United States yesterday advanced the date of argument in the government's suit to dissolve the United States Steel Corporation to Feb. 26.

(For complete prices see page 808.)

Car Buying is Active

October Promises to be Leading Month of Year in Orders—Indications That Some Buying is Not Made Public

New York, Oct. 17.—Another week of active car buying by the railroads has been shown. Awards of the past week total from 6,000 to 7,000, making about 15,000 cars already closed this month. If this rate is continued as there are indications that it will be from the amount of active inquiry, October will prove to be the leading month of the year in the volume of orders. There are signs that not all the cars being closed are being made public. It is known, for instance, that the New York Central lines have placed considerable business without making a general inquiry. The Standard Steel Car Co. has received a large amount of these, but the number is not yet definitely known.

The Pennsylvania railroad, which early in the year laid out a program for 1,500 50-ton hoppers to be built, at Altoona, has revised its plant so that these cars will be of the 60-ton type.

New orders this week include 2,500 gondolas for the Missouri Pacific and 300 gondolas for the Milwaukee Coke & Gas Co., both to the American Car & Foundry Co.; 760 of various types, including 400 flat, 250 box, 100 gondolas and 10 refrigerators for the Duluth South Shore & Atlantic to the Haskell & Barker Car Co.; 500 ore for the Chicago & North-Western to the Pullman Co.; 1,000 tank cars for the Union Tank Line divided equally between the Pressed Steel Car Co. and the Standard Steel Car Co.; 200 automobile for the Chicago & Alton to the Haskell & Barker Car Co. and 15 passenger types for the Great Northern to the Pressed Steel Car Co. The Union Tank Line also will build 1,250 tank cars in its own shops.

About 8,000 cars, exclusive of foreign negotiations, now are under formal inquiry. New lots asked for include 1,100 mine cars for the H. C. Frick Coke Co. and 200 automobile for the Detroit, Toledo & Ironton. Discussion of the large Russian order continues, but the question of financing still holds back definite action. It is reported that British influences are discouraging the financing of Russian equipment purchases in this country, as it is desired, if possible, to capture this business for the English works.

The Chicago & North-Western railroad is inquiring for 77 locomotives and the Western Maryland for 20.

Rail Sales Continues

Chicago, Oct. 17.—Inquiry and buying of standard steel rails for 1918 delivery continues and probably most important railroads will have their specifications in hand within a short time. Just what total of rails has been placed is difficult to determine, but one southern railroad is said to have placed an order for 57,000 tons, which will not be rolled in this district. It is understood that the Colorado Fuel & Iron Co. and the Tennessee Coal, Iron & Railroad Co. have booked considerable tonnages for 1918 delivery.

Considerable advances have been made by some makers on track fastenings and angle bars of standard section now are quoted in this market at 2.35c to 2.75c. Track bolts have advanced sharply and are now quoted here at 4c to 4.50c. Tie plates remain at $50 to $55.

Car Buying Lighter

Chicago, Oct. 17.—Although railroads continue to inquire for freight cars, the number bought during the past week from western makers is almost negligible. The Chicago & Northwestern railroad is inquiring for 1,700 gondolas and 1,000 30-ton wooden box cars, the latter involving practically no steel. The Detroit, Toledo & Ironton railroad is inquiring for 100 to 200 automobile box cars.

In Market for Steel

Cleveland, Oct. 17.—The Lima Locomotive Corporation is in the market for shapes and plates to cover its requirements for 70 locomotives to be built for the Chicago & North-Western railroad. Mills as a rule are not quoting on inquiries of this kind with any definite promise as to delivery, but are stating that deliveries will be made at their convenience. The Nickel Plate railroad has placed a second lot of 5,000 tons of steel rails with the Lackawanna Steel Co.

Buys Railroad Material

The Henry A. Hintner's Sons Co., Philadelphia, dealer in iron and steel metals, has purchased from the receiver, all the rails, equipments, etc., of the New Berlin & Winfield Railroad Co., which has been operating 8 miles of track running from Winfield to New Berlin, Pa. The road now is being dismantled. The property consisted of two locomotives, two passenger cars, two combination cars and six freight cars. The rails which are 35-pound sections, will be sold for export.

Louis F. Rothschild, of L. T. Rothschild & Co., New York brokers, has been elected to the board of directors and to the executive committee of the Worthington Pump & Machinery Co.

Norman P. Cooley has been elected treasurer and Logan E. Page secretary of the Hart & Hutchinson Co., New Britain, Conn., to succeed Guy Hutchinson, who resigned to accept a responsible place with the Willys-Overland Co., in New York City, Oct. 1. He will continue as a director of the company.

(*For complete prices see page* 808.)

Making Additions

The Phoenix Iron Works Co., Meadville, Pa., is erecting a 4-story brick and steel pattern shop and pattern storage building of fireproof construction. The company also is building a new power plant, which will provide an increase of about 500-horsepower. Three horizontal return tubular boilers, an engine and generator are being installed. The company recently placed an order for a cage-operated mono-rail traveling hoist of 6-ton capacity, which will be furnished by the Sprague Electric Works of the General Electric Co. The structural steel runway for the hoist will extend through the greater part of the plant and over the yard. The company is adding an open side planer, 84 inches by 72 inches by 16 feet. The company recently completed an addition to its steel plate shop and installed an additional overhead electric traveling crane and a 96-inch cupola, built by the Whiting Foundry Equipment Co., Harvey, Ill. The company is in the market for a 30 or 35-ton electric traveling crane with an auxiliary hoist.

Pipe Mills Busy

Pittsburgh, Oct. 17.—No important orders for steel or iron pipe have been placed in the open market this week, but it is believed that a number of proposed pipe line projects would be undertaken if line pipe and oil country goods could be obtained for shipment at an early date. Mills cannot promise line pipe for from six to 10 months. Several pipe makers virtually have withdrawn from the market on everything, except merchant pipe. The situation for boiler tubes and seamless tubing is much the same as it has been for many weeks; if there is any change, both products are scarcer than ever.

Robert Swan, director of the public works department of Pittsburgh, died unexpectedly, Oct. 14, at his home in that city. Mr. Swan was born in old Allegheny in 1859.

Canton Steel Plant Sold

Acquired by New York Bankers and New Corporation Formed —Very Large Earnings During Present Year

New York, Oct. 17.—The sale of the United Steel Co., Canton, O., for $16,000,000 to New York bankers was ratified by the stockholders last Saturday and it is announced that a syndicate headed by Hornblower & Weeks, Dominick & Dominick and Kissel Kinnicutt & Co., of New York, has disposed of the entire outstanding stock of the United Alloy Steel Corporation, a new corporation which will take over the works. The new corporation will be chartered under the laws of New York within a few days, with a capital stock of 525,000 shares of no par value, of which 500,000 shares have been sold and the remaining 25,000 shares will be held in the treasury. It is stated that about one half of the outstanding stock has been taken by interests identified with the old United Steel Co., and that outsiders who had been given the privilege of taking up the remaining half had oversubscribed this amount more than five times. It is announced that $4,000,000 additional will be put into the business as additional cash working capital. Enlargements now being completed will increase the ingot capacity to more than 600,000 tons a year and the rolling capacity to 750,000 tons, annually, of finished and semi-finished products.

Harry R. Jones, who has been vice president, treasurer and general manager of the United Steel Co., is to become president of the United Alloy Steel Corporation. Edward Langenbaugh, president of the old company, will continue with the new corporation in an official capacity. Representatives of the bankers who have purchased the property will be admitted to the board of directors, but no other changes are contemplated.

The United Steel Co. was incorporated in 1904, with a capital stock of $500,000, and since that time, $1,566,200 has been put into the business. The present capital is $1,500,000 and a a dividend at the rate of 30 per cent annually has been paid for some years. For the first seven months of the present year, the gross sales were $8,146,385. The net profits were $1,881,740 in the same period and the balance available for dividends $1,675,939. It is estimated by the bankers that the gross earnings for the entire year will reach $15,000,000 and the net earnings will exceed $3,500,000. The net profits in 1915 were $2,991,289; in 1914, $1,688,442, and in 1913,, $1,485,856. The United Steel Co. has devoted its business largely to the production of alloy and special steels and has developed a large business with the automobile trade.

Steel Common

Being Sold More Rapidly by Foreign Owners.

New York, Oct. 17.—Since United States Steel common has crossed the 100 mark, liquidation by foreign holders has been stimulated and records now are presented that during the three months ended Sept. 30, the amount of thjs stock owned abroad was reduced by 87,445 shares. This compares with a reduction of only 9,215 shares during the quarter ended June 30. As of Sept. 30, 537,809 shares of common were owned by foreign investors representing about 10½ per cent of the total issue. England has been the big seller, cutting down her holdings during the past three months from 299,092 shares to 214,524 shares, a loss of 84,568 shares. The foreign sales of Steel preferred during the third quarter also were heavy and the holdings abroad declined 65,265 shares to a total of 171,096 shares. The following table gives by countries the largest amounts of common preferred shares owned abroad as of June 30 and Sept. 30:

	Common.		Preferred.	
	Sept. 30.	June 30.	Sept. 30.	June 30.
Gt. Britain	214,524	299,092	61,089	116,666
Holland ..	236,107	236,467	25,144	26,294
France ...	44,595	44,803	29,133	29,686
Canada ...	32,666	32,822	37,232	37,598
Belgium ..	2,639	2,639	339	339

Shell Steel

Is Inquired for by the Government—Mills Sold Up.

Steel producers have received inquiries during the past few days from the war department asking bids on about 4,000 tons of shell steel for making 5-inch shells. These shells weigh about 60 pounds machined, the inquiry thus representing about 130,000 shells. In addition, during the past two weeks inquiries have been issued from Washington for from 10,000 to 15,000 tons, largely for use in making 4.7-inch shells and smaller. Delivery is to be made during the first seven months of next year. While mills are practically sold up, most of them had prepared for handling some government business and it is believed that the full tonnage desired will be secured.

Shell steel inquiries continue, but the fact that mills are practically sold out until July 1, prevents business being placed. Offers of 5c were made this week for shell steel. Some shell makers are finding that the tonnage they purchased is not sufficient to enable them to fill their orders, proper allowance not having been made for losses and rejections.

Some orders have been placed for delivery up to Oct. 1, this business being the first to be closed for third quarter delivery.

Prices of shell steel discards are stronger. One mill advanced its price $5 a ton this week. Another mill disposed of its entire output of discards until Jan. 1 for export at $27 a ton. This figure was for the complete discard, the mill being relieved of any shearing and cleaning operations.

Plant Improvements

The Tank Ship Building Corporation has considerably improved its plant at Newburgh, N. Y., by the addition of equipment designed to standardize the various stages of vessel construction. Included with machinery which it now is installing are a large multiple punch and a spacing table for handling large ship plates. The company so far has engaged in the construction of vessels almost exclusively for the Southern Oil & Transportation Corporation, of which it is a subsidiary, and it is likely that the requirements of the parent company will keep it busy a long while to come.

Could Not Buy Equipment

The Drawn Steel Co., which was reported recently as being incorporated with $200,000 capital by Cleveland promoters to manufacture cold-drawn steel, has announced that the project will be abandoned. The reason for this is said to be inability to secure the necessary equipment. It is probable, however, that the plans will be taken up at some future time.

Virgil G. Bogue, one of the leading civil engineers of the country, died on the Ward liner ESPERANZA Oct. 14 while returning from Mexico. He had performed engineering services in the construction of numerous railroads in South America, New Zealand and in this country, especially in the Pacific northwest.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

OTIS C. FRIEND, who resigned as sales manager of the Mitchell Motors Co., Racine, Wis., on Sept. 1, to engage in automobile accessory manufacture in New York, has returned to Racine to become president and general manager, to succeed H. L. MacClaren, who will devote all of his time to the presidency of the Racine Tire Co. John Tainsh, assistant sales manager under Mr. Friend, will direct the sales department, and has been given three assistants, viz.: Frank W. Pelton, advertising manager; William Lininger, eastern field representative, and F. W. Archer, in charge of distribution. George W. Hipple will continue as general merchandising counsel and Frederic Sarda as foreign sales manager.

Henry C. Frick has retired as a director of the Philadelphia & Reading Railroad Co.

B. V. Somerville, formerly principal assistant engineer, has been appointed resident engineer of the Pennsylvania railroad, lines west, with headquarters in Detroit.

R. A. Pyne has been appointed superintendent of motive power, eastern lines of the Canadian Pacific railroad, succeeding J. T. Main, who has been transferred.

P. H. Reardon, having disposed of his interest in the General Machinery & Supply Co., San Francisco, to his associates, is succeeded by Joseph A. Buckley as president.

Walter Loeb, of New York, who had been purchasing considerable quantities of iron and steel products, as a representative of Enrico Ghisler, Genoa, Italy, has sailed to confer on various matters with his home office.

C. H. Norton, master mechanic of the Erie railroad at Abon, N. Y., has been transferred as master mechanic to Susquehanna, Pa. F. G. Wallace, Dunmore, Pa., has been appointed to succeed Mr. Norton.

J. W. Flavelle, chairman of the imperial munitions board of Canada, will leave for England early this month to consult with the British government with regard to the production of munitions in Canada.

W. T. Robertshaw of James Robertshaw & Sons, Ltd., Manchester, England, who has been in the United States to buy steel, has sailed for home. Mr. Robertshaw was disappointed in obtaining the material he desired because of the sold-up condition of the American mills.

Clarence Brady, Kenosha, Wis., has been appointed general superintendent of the Hercules Powder Co.'s middle western plant in the town of Pleasant Prairie, Wis., to succeed H. M. Smith, who retired Oct. 1.

W. H. Kestin, former assistant general director of the Truscon laboratories in Detroit, has become advertising manager of the Northwestern Steel & Iron Works of Eau Claire, Wis.

George H. Gibson has been appointed assistant to the general manager of the Commonwealth Steel Co., Granite City, Ill. A. F. Howe has been appointed general superintendent in charge of the operation of the plant at Granite City.

Henry Ford, who will erect a blast furnace plant at Detroit under the direction of Julian Kennedy, engineer at Pittsburgh, recently inspected blast furnaces in the Pittsburgh and Youngstown districts. He was accompanied by Mr. Kennedy.

Harvey L. Slauson has resigned as secretary of the William L. Gilbert Clock Co., Winsted, Conn., with which he has been identified for about 11 years, to accept a position with the American Graphophone Co., in Bridgeport, Conn. He is succeeded by General Manager C. E. Williams.

P. O. Wood, superintendent of locomotive performance of the St. Louis & San Francisco railroad, has been appointed assistant general superintendent of motive power, with headquarters at Springfield, Mo. W. H. Malone, Springfield, will succeed Mr. Woods.

D. L. Wilkoff, formerly connected with the Wilkoff Co., Youngstown, has been made district manager of the recently opened Pittsburgh office of Luria Bros. & Co., Reading, Pa., dealers in old materials. The Pittsburgh office of the company is in the Park building.

F. O. Ebeling has been appointed resident engineer of the new De Pere, Wis., plant of the Joliet Bridge & Iron Co. Mr. Ebeling is a graduate of Cornell University. John Strondeck, superintendent of the Joliet plant, has been appointed superintendent of the De Pere works, and will divide his time between De Pere and Joliet.

George H. Brown, for a number of years a ceramic engineer identified with the United States Bureau of Standards at Pittsburgh, resigned Oct. 1 to become director of the department of ceramics at Rutgers College, New Brunswick, N. J. Prof. Brown was graduated from Ohio State University in 1908.

Marion C. Bias has been appointed manager of the purchasing department of the Mitchell Motors Co., Inc., Racine, Wis., to succeed Guy W. Morgan, who resigned Sept. 1 to assume the presidency of the Abbott Corp., Cleveland. Mr. Bias joined the Mitchell organization in 1909, coming from the International Harvester Co.

W. B. Connor, Inc., has been appointed general sales agent in New York for the Erie Engine Works, Erie, Pa., manufacturers of steam engines and boilers. Larger facilities have been required by the Erie Engine Works in New York territory to meet its domestic and export business and the sales offices now are located at 90 West street.

C. B. Kelley has been appointed manager of the new plant of the American Sintering Co. at Youngstown. The Youngstown plant will sinter flue dust from the blast furnaces of the Republic Iron & Steel Co., the furnace of the Ohio Iron & Steel Co., the furnaces of the Youngstown Sheet & Tube Co. and one stack of the Struthers Furnace Co.

G. A. White, formerly metallurgist of the American Sheet & Tin Plate Co., is now associated with the Titanium Alloy Mfg. Co., of Niagara Falls, in the same capacity. Mr. White's long experience in the manufacture of sheet steels makes him a most valuable addition to the metallurgical force of the Titanium company. Prior to his connection with the American Sheet & Tin Plate Co., he was for a considerable time with the Rock Island railroad and also with the Eastern Steel Co., Pottsville, Pa., where he was engaged in the manufacture of structural material. It is, however, in the manufacture and treatment of sheet steel that Mr. White has done his most notable work.

Wire Advance

Announced by Leading Interest—Coke and Pig Iron Still Climbing

Pittsburgh, Oct. 18. (By wire.) — Effective today, the American Steel & Wire Co. put up its prices $2 a ton on all wire products and now is quoting on the following basis: Wire nails, $2.70 a keg; plain wire, $2.65; galvanized barbed wire, $3.55; polished staples, $2.85; galvanized staples, $3.55; painted barbed wire, $2.85, per hundred pounds to jobbers. The last previous change in prices was made Aug. 5 when quotations were advanced $2 a ton. No change has been made in the price of wire fencing. The trade had expected an advance for several weeks. Independent manufacturers are adopting the new prices.

Several dealers of bessemer pig iron have advanced prices to $26, valley, but no actual sales of over $24, valley, have been made in the open market. A Cincinnati interest is negotiating for 12,000 tons of bessemer iron for delivery next year.

The market for foundry grades is active and the tendency of prices continues upward.

Connellsville furnace coke for spot delivery rapidly is heading for $6 a ton. Sales at $5.75 are reported.

Cast Iron Pipe

Detroit Purchase Almost Record — Placed With American Plant

Chicago, Oct. 17.—The feature of the cast iron pipe market during the past week was the purchase by the city of Detroit of 30,400 tons of 36-inch, 42-inch and 48-inch water pipe, which will be furnished by the Detroit shop of the American Car & Foundry Co. This is one of the largest contracts for water pipe that has been made in recent years. Last year Detroit took practically 30,000 tons on a purchase of 25,000 tons with provision for further pipe if needed. In 1910 San Francisco bought 45,000 tons of high pressure 6 to 20-inch pipe, which seems to hold the record.

The American Cast Iron Pipe Co. has been awarded 750 tons of 6-inch pipe at Kansas City, Mo., and the same city has awarded 575 tons of 36 to 48-inch pipe to the United States Cast Iron Pipe & Foundry Co. West St. Paul has bought 578 tons from the American Cast Iron Pipe Co.

Practically no important inquiries are now being considered and the market is unusually quiet. Quotations remain nominally at the figures that have prevailed for the past fortnight.

Large Orders Pending

Birmingham, Ala., Oct. 17.—While the cast iron pipe market cannot be classed as very active, yet there were several round lots booked during the past week, and one or two large orders are pending which will probably be closed early next week. One order was booked during the week for Panama by a local interest. One of the leading manufacturers characterized the market as satisfactory, but not in keeping with the demand for pig iron. The bulk of the business has been for comparatively small orders.

Holland in Market

New York, Oct. 17.—Holland, which has been buying pig iron in this country heavily, now is coming into the American market for cast iron pipe. An initial inquiry bid upon this week by American foundries, calls for 3,000 to 5,000 tons of 12-inch and smaller diameters. It is believed that this inquiry may be a forerunner of important business. South America continues to put out inquiries from time to time, but sales are not many. The leading development in the pipe market has been the increased buying by private consumers, such as water and gas companies, some of which is for next spring delivery. Good quantities have been taken and asked for. This business has given the market a considerably better tone. Municipal requirements still are coming out very slowly. Boston took bids the past week on 1,500 tons of 60-inch for sewer construction. A 2,000 to 3,000-ton requirement for Newark, N. J., is expected to appear in a week or so. Pipe prices are firm.

W. H. Bishcoff, who recently was appointed superintendent of the steel works of the blast furnaces, coke ovens and open-hearth furnaces of the Dominion Iron & Steel Co., Sydney, N. S., was presented with a silver tea set and traveling bag by his former associates of the Bethlehem Steel Co. upon his departure to take up his new duties.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, Oct. 17. — The underlying strength in practically all metals continues, although the markets, with the possible exception of antimony, have been relatively quiet. In antimony, a greatly increased demand is in evidence and prices have advanced sharply. During the past few days, it is estimated that Canadian interests have taken as high as 1,000 tons of nearby material out of the market. These consumers still have further inquiries pending. Italy also has inquiries in the American market but as yet has not placed any business. While no large orders have been noted, the tonnages taken by domestic consumers during the past week have aggregated a big total. Wah Chang's W. C. C. brand may be quoted today at 13c to 14c, duty paid, New York. Domestic brands are now holding at approximately the same relative level.

Sizable tonnages of electrolytic copper are being taken by domestic buyers, although within the past few days demand from these interests has been slightly smaller. Large producers still are holding firm and prices generally are fairly steady. The situation as a whole, however is relatively quiet. Some buying has been done for foreign account, but this has not been of large volume. Electrolytic quotations in terms of cash are as follows: Prompt and October, 28.50c to 29c, New York; November, 28c to 28.50c; December, 27.50c to 28c; first half, 26.75c to 27.25c. The market for lake and casting copper also is rather quiet. Prime lake for prompt, October and November shipment is holding at 28c, cash; while December shipment is quoted at 27.75c, cash. Ordinary casting copper is quoted as follows: Prompt, 26.50c to 26.75c; October, 26.25c to 26.50c; November, 26c to 26.25c, all cash.

The demand for spelter is dull. A slightly better inquiry from domestic consumers was noted yesterday and today, but the buying was small. Producers of brass special are rather encouraged over the inquiry which continues in evidence for that grade. Although buying is not anywhere near the proportions of that which prevailed around the beginning of the month, it, nevertheless, is an improvement over that done up until just recently. Prices on prime western have slumped off and may be quoted today as follows: Prompt and October, 9.50c to 9.62½c; November and December, 9.37½c to 9.50c; and first quarter, 9.12½c to 9.37½c, all St. Louis base. Brass special is holding at approximately 10.50c to 10.75c, St. Louis, for prompt shipment.

Tin now is working back to normal after the excitement which prevailed recently over the German submarine activities. Straits tin for spot shipment now is holding around 41c, New York. Buying is of a restricted nature. Consumers apparently are waiting for further declines, while sellers are backward about making concessions. One factor for strength in this market is that shipments into this country so far this month are comparatively small and it is estimated in some quarters that arrivals for October will not amount to more than 2,000 tons.

The outside aluminum market is quiet and the export demand which was in evidence last week has disappeared almost entirely. Owing chiefly to the great scarcity of No. 1 virgin high prices still prevail. The market may be quoted as follows: For spot shipment: No. 1 virgin, 64c to 66c; No. 1 remelted, 60c to 62c; No. 12 alloy 47c to 49c. The Aluminum Co. of America, it is understood, has renewed practically all old contracts through 1917 on the basis of 35c, f. o. b. smelter, for No. 1 virgin ingots.

(*For complete prices see page* 808.)

Making Blast Furnace Work Safe–I

Over 75 Per Cent of Accidents Are Due to Commonplace Causes—The Author Presents Practical Suggestions for Eliminating Many of the Hazards of Blast Furnace Operation

BY FREDERICK H. WILLCOX

IN attacking the accident problem in a blast furnace plant, it should be realized at the outset that it is impossible to prevent all accidents. On the other hand, it is not necessary to inaugurate a complicated and expensive campaign in order to remove many of the hazards surrounding the workmen. The ordinary methods employed every day in keeping production up to the required standard, maintaining equipment, guarding against incompetence or enforcing discipline, can be profitably applied to avoiding accidents, carelessness, awkwardness or unnecessarily hazardous conditions.

The accompanying list of causes of accidents shows that about 75 per cent deal with the improper use of hand tools, falls, falling objects and similar mishaps incident to daily work. Machines, cranes, hoists, railroads, explosives and other obviously dangerous factors represent a comparatively small percentage of the total. It is apparent, therefore, that the number of injuries can most easily be reduced by eliminating the commonplace dangers to which the majority of the workmen are daily exposed.

The foremen, who are in close daily contact with their men, are familiar with plant conditions, and who have supervisional authority, are naturally the men best fitted to take the responsibility for safety work. When properly supplemented with the work of suitable committees and with the co-operation of gang leaders, inspectors and others, the efforts of the foremen cannot fail to bring about a noticeable reduction in the number of accidents. On account of the part played by foremen in safety work in a blast furnace, suggestions pertaining to their duties come first in the order of importance. Avoid employing a man whose language no one of your crew can speak. Do not place a slow, heavy man where a quick, active one is required, or a slow thinking man where a quick witted one is required. Moreover, do not keep on the same job a man who gets hurt frequently in that occupation unless the labor supply is inadequate or men cannot be shifted. When a man is employed or put to work on a new job instruct him as to his work and how to avoid accidents, warn him of unusual or obscure danger, and then put him under the charge of the gang leader or straw boss. You should consider yourself personally responsible for accidents that happen to your men from their ignorance of danger or of safe methods. Therefore watch for dangerous practices, ignorance, lack of skill and carelessness, and take the necessary steps to correct faults when first noticed. Most men can be taught and encouraged to use proper methods of work, but when necessary impress on the men by admonition, warning, suspension or discharge your attitude against carelessness or indifference. Drill your men to report immediately when injured, however slightly; send an injured man to the doctor or first-aid man, and then investigate the accident at once and discuss it with the subforeman and workmen in order to bring out clearly the cause and impress it on their minds.

THE bureau of mines has been instrumental in preventing accidents in many different industries. In this article, which is a liberal abstract of Technical Paper 136, the author describes methods of preventing accidents and points out the obscure dangers of blast furnace operation. The suggestions offered are intended to serve as useful memoranda to foremen and workmen, and should not be regarded as rules to be administered indiscriminately. If the precautions presented are gradually impressed upon the minds of those engaged in the plant, the number of preventable accidents will slowly but permanently decrease.

Be watchful about the furnace. Gas may be escaping in many places and may kill you before you know it is present, the furnace may slip, the bosh or hearth of the furnace may break out, a tuyere may burst, or a blow pipe burn through, or there may be an explosion. Keep out of the cast house except when your work calls you there. The furnace crew can sometimes tell when these things are about to happen by signs with which they are familiar; at times they happen without warning. Stay at your own work and be safe. Keep away from the bottom of the dust catchers, from under the downlegs of gas mains, and off of manhole covers of gas flues. Do not stand near iron and cinder ladles while they are being filled, shifted or poured. Do not go near a cinder granulating pit while it is in use and do not stand about gas burners or air doors of stoves. Never go on top of a furnace or gas washer unless under the direction of the foreman, or accompanied by some one. The tops of boiler settings, gas engine basements, skip pits and ore bins should be avoided unless your work takes you there. Before you begin work in such places, or in any place where there is a possibility of danger, wait until the foreman has told you that it is safe to go. Satisfy yourself that the place has been made as safe as possible. Never look in the peep holes of the tuyere stocks unless it is part of your duty. Always watch when passing near the fur-

Causes of Accidents at Blast Furnace Plants

(In order of Importance)

1. Hand labor.
2. Hand tools.
3. Flying and falling material.
4. Falls of person.
5. Burns from hot metal.
6. Machines and machinery.
7. Cranes, hoists and rigging.
8. Hot water and steam.
9. Burns from cinder.
10. Flames.
11. Railroads.
12. Asphyxiation.
13. Slips.
14. Illness, including intoxication.
15. Hot flue dust.
16. Electric machinery.
17. Explosives.
18. Fighting and playing.

If *burns from hot metal* and *burns from cinder* are grouped together they rank third. *Hand labor* and *hand tools* cause over 40 per cent of all accidents; if *flying and falling material* and *falls of person* are included, over 60 per cent of all accidents are represented; and if *burns from hot metal and cinder* are added the total represents approximately 75 per cent of all blast furnace accidents.

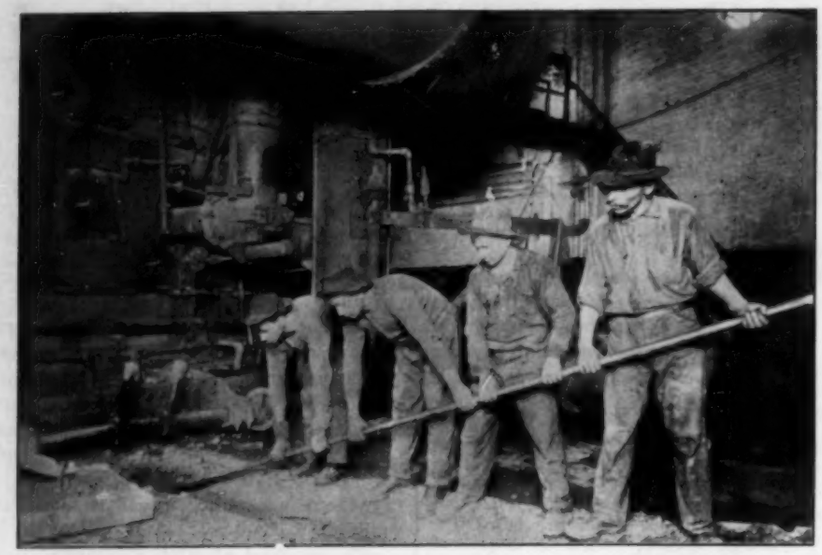


FIG. 1—AN UNSAFE WAY TO OPEN THE TAPPING HOLE
The trough is not covered to protect the workmen, and they are wearing loose fitting clothing which easily ignites from sparks and splashing metal

nace. Remember that frequently it is impossible for the furnace men to tell when the furnace is going to slip.

Do not refuse to use safeguards, do not ignore rules and orders, or disregard danger signs. There is a reason for each and every one. Be sure to report every accident, even the slightest burn, cut, bruise, puncture, or substance in the eye, as this may prevent a trivial hurt from becoming a serious injury. Do not set bad examples by bravado, thoughtlessness or negligence, for less experienced men to follow. Use common sense as well as foresight and watchfulness. Those who cannot read and speak English should be urged to acquire a working knowledge of the language at the earliest opportunity. By so doing they will be in a better position to heed warnings and become acquainted with dangerous practices.

Acquaint laborers and new men with the possibilities of slips, gas, breakouts and bursting tuyeres. If you can show them how to be less clumsy in handling tools do so, because awkward men may injure others as well as themselves. If you see any one doing something that is dangerous or standing in some place where he might get hurt, tell him of the danger. If a man's clothes catch on fire, do not let him run. Put the fire out with a hose, or roll him in sand and smother the fire by throwing sand on it, or wrap him in a blanket or coat. If a man is gassed or receives an electric shock get him into fresh air, notify the foreman and give him artificial respiration at once; loosen his clothing, take any tobacco out of his mouth and keep him as warm as possible.

Always wear clothes made of wool or hard jean cloth, if possible, and especially avoid greasy clothes, as they will readily catch fire. Wear stout shoes having thick soles and without cracks or holes, that are not too low and fit tightly about the leg. Congress shoes and leggins are advisable. Wear goggles or a mask to prevent injury when handling hot metal or cinder, breaking scrap with sledges, or turning hose on hot material. Fig. 2 shows a man wearing leggins, goggles, felt hat and woolen shirt, which makes a sensible outfit for cast-house work. Never wear ordinary gloves or hand-made hand leathers in handling jagged pieces of scrap. Leathers or gloves with a safety spring in the back are the only safe ones, as the scrap will frequently catch the glove or leather and may cause a serious sprain or fall.

When breaking runner scrap, slag, lumber, test pieces, etc., with sledges, use judgment in blocking up the pieces before breaking them. The

FIG. 2—SENSIBLE CLOTHING FOR A CAST-HOUSE MAN

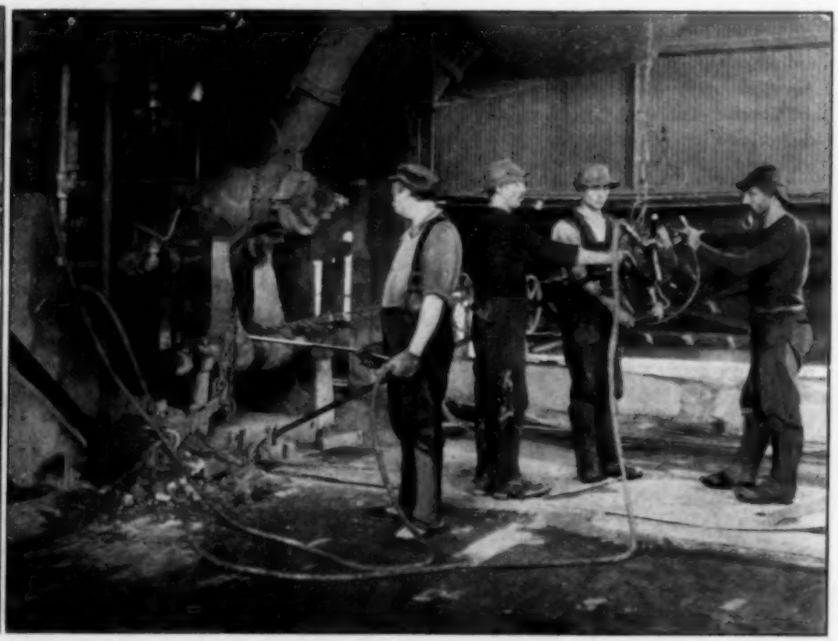


FIG. 3—SAFE WAY TO DRILL THE TAPPING HOLE
Men are properly clothed and trough is covered. The front of the tapping hole is properly shielded

closer the material is to the floor, the less probability there is that it will fly in breaking. When barring scrap, plates or other objects, be sure that the point of the bar is firmly engaged, or that the bar will not slip off the block before you lift or put your weight on the bar. Keep your working place cleaned up. Bars, drills and long-handled tools should be kept where they will not fall and injure any one, by preference in a tool rack. If they are leaned against the wall, place them so they can not easily be knocked over or fall down. Don't leave tools where men can stumble over them. Remove burned drills and bars promptly. Watch out for hot bars and don't throw bars without looking to see whether some one may be hurt by their rebounding. Be careful when the cast house is full of steam; feel your way, do not attempt to go quickly.

When a blast furnace is being blown in or blown out, banked, stopped for a time, or started up, it is more dangerous than in regular running. At such times do not rely upon your own knowledge of furnaces, but follow every direction of the foreman strictly. Do not do any of the routine duties about the stoves, dust catcher, bleeder, cinder notch, tapping hole, or tuyeres except by direction of the foreman or blower.

Don't go on the bustle pipe unless you notify the stove tender, keeper or blower. When you have to work where you can smell gas, take frequent spells in fresh air and work with another man. Do not stay where there is gas unless your foreman knows the condition and that you are there. Do not rest or stand under, near or in front of blowpipes or tuyeres, as they may burst or burn through and throw metal, cinder, coke or gas over you. When you know that the furnace is hanging, keep under cover and warn others. Keep away from the bottom of dust catchers, stove burners, downlegs and manholes of underground flues at such times. In going to and from work avoid going under cranes carrying loads or under skip inclines, or through stock houses, boiler rooms, or places where you are unfamiliar with the work which is being done there. Do not try to do work other than your own about the furnace unless you are familiar with the work or have been ordered to do it. Especially do not try to help the hot-blast man on shutdowns or on work with the bleeder, mixer valve, or any regulating part of gas or blast mains unless everything you do is specifically directed by him. Many accidents have been caused by misunderstanding what some one else was doing.

Always use every safeguard provided—goggles, masks, shields, safety hand leathers, tongs and gloves. They are provided to prevent injury to

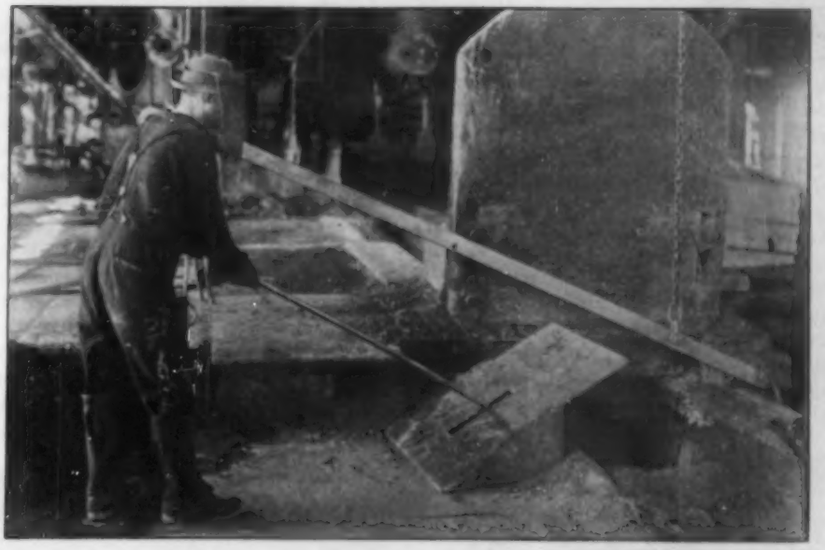


FIG. 5—SAFE METHOD OF OPERATING PUNCH-OUT GATE
The operator's face is protected, and the bar passes through a slot in a shield which provides further protection

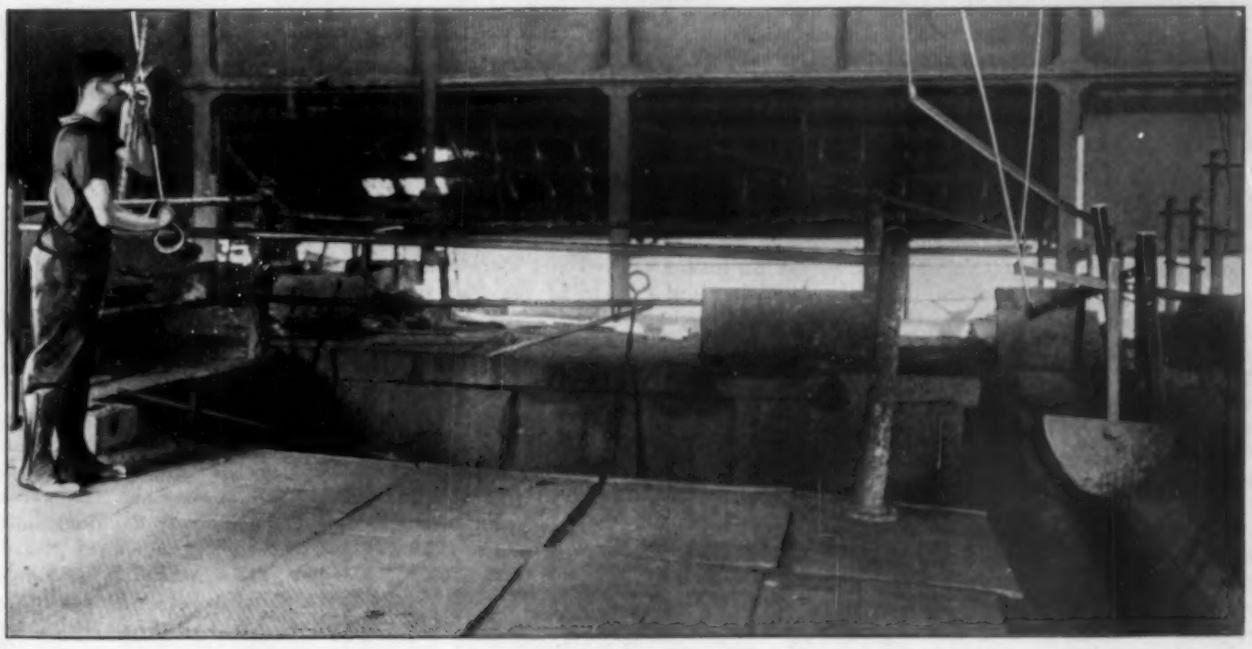


FIG. 4—A MODERN RUNNER GATE
The cables and levers which operate the gate permit the operator to stand at a safe distance from the hot metal

yourself and men at other plants use them. Refusing to use them is not a sign of bravery or of familiarity with your work, but rather of foolhardiness and ignorance of the danger.

Do not drive the tapping bar through the skull in the tapping hole, or go on the last spell on the drill before you have placed the splasher and put a shield in front of the tapping hole, or a cover plate or sheets over the trough, in front of the splasher except under unusual circumstances. Safe and unsafe methods of drilling the tapping hole are shown in Figs. 1 and 3. When it is necessary to pull the tapping bar out don't hold onto the "welshman". Lay a bar across the runner to support the tapping bar while driving it out; the molten iron may rush out unexpectedly and burn you.

Do not stand in front of the iron notch when opening it; work from the side as much as possible, even on the first spell, and keep your feet out of the trough. Be especially careful when working on a short, green, hard or an unusually long hole. On changing turn, the keeper going off duty should inform the one coming on as to the condition of the tapping hole. If the hole has been working short or badly, and has not been taking the clay, the keeper should inform the other keeper and tell him how much clay was used on the last stop. His work will then proceed intelligently. Do not cast until the skimmer, trough, runners, shutters and spouts are dry and warm. Clay, sand, loam or coke dust in the runners must be dry to avoid boils of molten iron. Do not leave pieces of cold scrap in the runners or place damp sand against the shutters or gates. Don't let pieces of wood get under the skimmer dam or drain gates and bank up the drain or punch-out gates on the outside with dry sand. In filling the mud gun before a cast, only one man should do the work if the clay is being fed at the funnel, because if two men are used, one to operate the plunger and one to feed the clay, one of them may be caught by the plunger. In loading clay at the funnel do not push it down with your foot; use a stick. However, the gun can be loaded as well and more safely by putting clay in at the nose of the gun with a rammer. When the gun is loaded put about 3 inches of dry sand or ground ganister mixed with tar or black oil in the nose, removing enough clay to give room. Wet or sloppy clay may cause an explosion when it comes in contact with hot iron. Do not wet the nozzle of the mud gun. Daub it with black oil after casting, while it is still warm and again just at cast time. This will help keep it from getting wet and will prevent a "shot" if the nose of the gun is placed in the hole against a stream of molten iron. Oiling the nose of the gun is better than warming it, because if the nose is heated too much or too long the clay will become dry and stiff, and may cause a short hole. If heating the nose is preferred, pouring one or two hand ladles of cinder over it should be sufficient.

When casting do not us cold or wet bars to poke out sand, clay or loam in the runners or gates or to break a path for the iron. Lift the punch-out or drain gate slowly to avoid a rush of iron, which may cause boiling, and be sure the punch-out bar is warm. Fig. 5 shows a safe method of operating a punch-out gate. Before turning the iron into a ladle see that the ladle is spotted and is all right. Do not fill the ladle within more than 8 or 9 inches of the top, as the iron may be spilled in shifting it. Do not throw large pieces of cold scrap into the ladle before or during the cast, as it may cause boiling or an explosion of the hot metal. It is safer to fill the ladle nearest the furnace first and finish the cast in the ladles at the lower end, for several reasons. One reason is that the gates may be lifted quickly and the operator go away instantly. The gates should be equipped with a safe controling device, as shown in Fig. 4. If the iron is run to the bottom ladle first, be sure that all shutters are dry; if to the top ladle

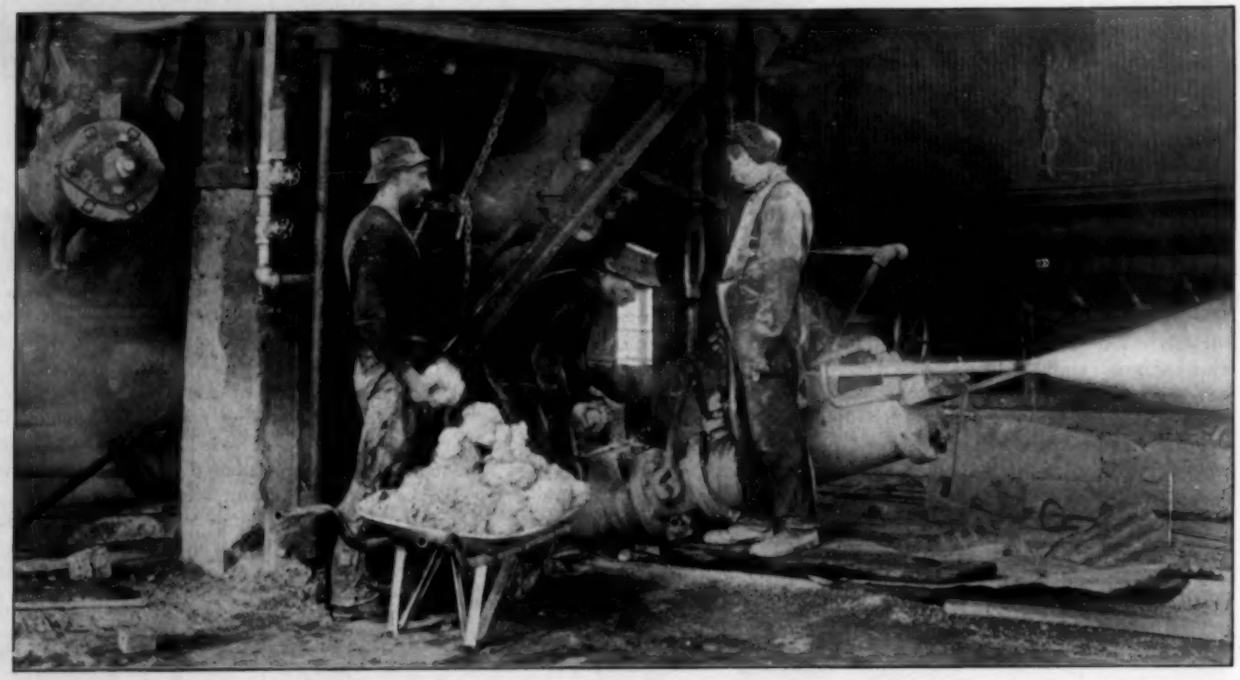


FIG. 6—UNSAFE METHOD OF STOPPING THE TAPPING HOLE
The helper is standing too near the hole, and is handling the clay with his hands. This is a dangerous practice and should be avoided except in emergencies

first, be especially sure the sand at the gates is dry. When using the pricking rod on an obstruction in the tapping hole, do not throw too much weight on the rod if standing close to the trough. Be sure that the hand ladles and chills for samples and pig-machine wheels are dry. Do not cross iron or cinder runners during a cast except when necessary, and watch your step very carefully; if you have to go in front of the iron notch, get across quickly. Do not step on the crust of hot cinder. Do not flip wet clay into hot iron to annoy or tease a fellow workman. It is an extremely dangerous practice. Also in stopping the tapping hole, be cautious when placing the mud gun in the hole. Unless the cinder and iron in the trough lays away from the hole, drain the trough before putting the gun in. Do not put the gun in the hole against a stream of iron unless the nose is warm and dry, as the iron may explode. After the gun is clamped, turn the steam on by the valve at the column, or by means of a long hook open the three-way cock on the gun. There is danger of gas bursting out or cinder being thrown back when the first clay is shot in. Care must be exercised in stopping the hole after the first shot, as the pressure in the furnace and the suction of the plunger may throw the clay back in the barrel of the gun and a burst of gas or slag follow. It is safer to feed the clay into the gun with a shovel rather than to stand close to the hole and trough, unless one is expert at throwing the balled clay into the funnel from a safe distance. Safe and unsafe methods of stopping the tapping hole are illustrated in Figs. 6 and 7. As stated before, use a stick—not your foot—to poke clay down into the funnel. While stopping the hole do not stand so that your weight is on the sheets covering the trough, and watch for the exhaust steam. Do not put the wind on until the hole has stopped taking clay freely, and after the hole is stopped leave the gun in it with steam on until the clay has set; this may prevent a breakout at the tapping hole between casts. If men are changing tuyeres or plates, never throw or turn water into the funnel of the mud gun or use wet clay before the hole is entirely stopped, as gas may blow out on the tuyere men. Step away from the gun for a moment when shooting water into the hole.

Never tighten the keys on the tuyere stocks or caps, or take up slack on the bridles when the blast is on unless you are directed to do so by the foreman. Watch for tight bridle springs or split stock hangers, and don't screw up the nut on the bridle until the spring is tight. Do not start to loosen the monkey or stock bridles, hangers, keys or caps until the blast is off and the gas is drafted back. Wear goggles when watching the peep sights during a cast or check, and do not open the peep-sight plug until you are sure no one is in line with it. Don't try to blow coke out of the eyesights until the blow pipes have had time to cool. Know where the hose and water valves are situated in the cast house, as they are needed quickly at times. When playing the hose on tuyeres, blowpipes, or the furnace jacket, stand behind a column as much as possible, or to one side, as they may burst or burn through. In case a tuyere bursts or a blowpipe burns out do not work about them unless thoroughly familiar with the danger. Work to one side as much as possible when dropping blowpipes, claying up and changing tuyeres, as cinder, coke, or gas may blow out. The tuyere opening should always be firmly plugged with clay as soon as the blowpipe is dropped. Never work about an open tuyere or plate when water or wet clay is being put in the tapping hole. Watch for hot bars, blowpipes and scalding water or steam. Do not put up the blowpipes after a shutdown until the foreman orders you to, for unless the blowing engine is turning over it might cause an explosion. Don't look into a blowpipe when cutting out clay after a stop.

When plugging the cinder notch, wear goggles or a mask and long leather gloves; be sure of your footing, and always use the shields provided. Work from the side of the

FIG. 7—SAFE METHOD OF STOPPING THE TAPPING HOLE

The helper handles the clay with a shovel and stands at the side of the hole instead of directly in front of it. Unless a man is expert at throwing clay balls into the funnel from a distance, he should use the shovel

cinder notch as much as possible when opening it, and when breaking cinder in the runner during a flush keep out of line with the cinder notch and be careful the cinder does not splash on your feet. Cinder will splash farther than iron. Keep as far away as possible when throwing coal in the cinder runners. It is just as well not to throw coal into stiff cinder as it does not greatly help matters.

Do not throw damp or wet rubbish in the cinder ladles, and always examine them for water or dampness and dry them out with cinder before flushing or casting, because a damp ladle may boil or explode when being filled. Keep away from the granulating pit when the skimmer trough is being drained or when you think iron is coming over the cinder dam. If it is necessary to plug a cinder ladle with clay, always place a sign or station a watcher before going into the ladle. Be sure there is no one in a car or ladle before throwing rubbish into it.

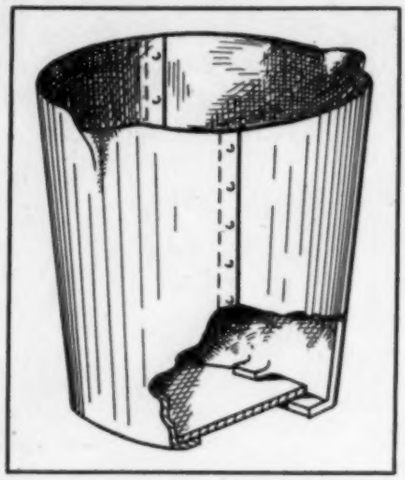
Report Signs of Trouble

Be prompt to report anything abnormal or unusual about the furnace —for instance, the blast pressure becoming high or low; hanging, tightness or slipping of the burden; cold or dirty cinder; sloppy, dead or leaking tuyere; gas lighting on the bosh or about the mantle; hot spots on the shell; delays in filling the furnace or in spotting iron or cinder ladles; wind and gas leaks; or signs of a break out, such as steam or gas coming from about the jacket, columns, or pavement, the water getting hot or steamy in the discharge from the hearth or bosh jacket or on the jackets, or the pavement or columns getting unusually hot. Especially, report promptly any signs of the cooling water supply becoming slack. Neglect of these points oftentimes leads to unnecessary hard work and danger from messes, breakouts, slips, burned tuyeres and blowpipes or explosions.

(*To be concluded next week.*)

Develops Steel Ladle Bowl

Theodore P. Byram, for many years treasurer and manager of Byram-Co., Detroit, manufacturer of general foundry equipment, has been granted a patent on a steel ladle bowl which is said to embody several new and distinctive features. It is said that the purpose of the designer of this bowl was to produce a ladle capable of being made in any diameter in small lots for special uses, at the same time keeping the cost within a limited sum. These ladle bowls are designed for use in gray iron foundries and are all provided with vent holes. They are not intended for melting babbitt, lead and other similar metals. Special bowls of this same type may be employed for this purpose. The bowl consists substantially of a cylindrical body having a number of incisions at its lower edge constituting lugs which are turned in above the remaining portion of the lower edge. A bottom consisting of a flat disc, may be inserted from the lower end of the body and abuts with its face against these lugs. The lower edge of the body portion may be turned inward around the margin of the bottom in contact with the lower face of the inserted bottom, by which action the bottom



STEEL LADLE BOWL

is confined between the lugs and the body. The cross section in the accompanying illustration illustrates the novel construction of this ladle bowl. These bowls are made in a number of sizes and in types adaptable to a number of purposes.

The United States bureau of mines recently issued a technical paper entitled, "Health Conservation at Steel Mills," which should be of interest to all manufacturers having the welfare of their men at heart. The "safety first" work which is being so extensively carried on is highly praised and it is suggested that the slogan be extended to include "health first" also. The need for measures which will tend to check disease is shown by statistics given in the paper. According to these, the average loss of time due to illness among approximately 30,000,000 workers in the United States is nine days a year. This is 270,000,000 working days or about 750,000 working years annually. If medical attention be estimated at one dollar a day and earnings at two dollars a day this loss amounts to nearly $800,000,000 annually. The greater efficiency of the man who is in good health than that of the man who is half ill is pointed out and causes of occupational disability are discussed. Proper attention to ventilation, illumination, temperature, etc., is urged, together with the constant attendance of a doctor who will have charge of the plant hospital, will see that the men are kept in good physical condition, and will also co-operate with the "safety first" men in the endeavor to see that conditions around the plant are clean and sanitary.

Canadian Iron Pyrites Deposits

The earliest mining of iron pyrites in Ontario was done in 1868 on the Billings property near Brockville. The mines were closed down in 1879 under the assumption that they were exhausted. Many other pyrite deposits have been worked for gold, iron or copper at some time. The steady pyrite industry of the province began in 1900 when ore from the Bannockburn mine was produced. Mines in Hastings county have been steady producers since that time. An acid-making plant has been in operation at Sulphide since 1907 by the Nichols Chemical Co. for the treatment of its ore. This company uses its own ore and also buys the ore mined from other properties in the neighborhood. Another plant for treating custom ore is operated by the Grasselli Chemical Co. at Hamilton. These two plants treat the bulk of the eastern Ontario production, the remainder being shipped to the United States.

Recently a large percentage of the production has been coming from the Vermillion lake deposits in northwestern Ontario, the ore being shipped to United States ports on the great lakes. Another property, the Goudreau lake deposits, has been recently developed and expects to commence at once supplying large tonnages. The Helen mine operated by the Algoma Steel Corporation, produces some pyrite which is treated in its plant at Sault Ste. Marie.

The iron pyrites resources of Ontario are of considerable extent and value, in the last 15 years 538,755 tons, worth $1,438,122, having been produced, the greater part coming from southeastern Ontario. During the coming years there will undoubtedly be a steady increase in production. The war has had a stimulating effect on the demand of the United States for pyrite from Ontario.

The Physician in Modern Industry

A Realization of the Value of Health as an Aid to the Efficiency of Employes is Responsible for the Emphasis Laid by Employers on Proper Medical Attention in Industrial Practice

BY MAGNUS W. ALEXANDER

IN THE early history of medical work in industry, the regular employment of a physician in an industrial establishment was usually considered an evidence of a largely benevolent attitude on the part of the employer. Whether or not this assumption was true, the results showed that the work of the physician in industry proved beneficial to the employer as well as to the employe, by protecting both against undue expense arising out of injury and sickness and by promoting a better mutual relationship. The results also proved that medical supervision of employes increased their efficiency, and that prompt medical and surgical treatment of injured and sick employes prolonged their lives and the period of their industrial usefulness. As these advantages became known among employers, medical supervision of employes was introduced into many plants, particularly into establishments where large numbers of workmen were employed.

The great value of the physician in industry became even more generally realized when workmen's compensation laws went into effect, compelling the employer to shoulder the expense of injuries to employes regardless of the fault of either party. These laws forced the employer, in self-defense, not only to provide adequate medical and surgical treatment for employes injured in his establishment, but also to exert all reasonable effort for the prevention of future accidental injuries and for the elimination of working conditions that might prove harmful to the health of his employes. Experience, however, had shown that physique, temperament and general physical condition of employes affected to a large extent their liability to sickness or injury. Some men could safely do work that constantly required considerable physical effort, while the same work would cause discomfort and strain to other apparently strong men. Employes with defective vision would suffer headache while doing work that required close application of their eyesight, while others with normal vision would naturally have no such trouble when similarly engaged. Contact with certain odors or liquids used in manufacturing processes would cause skin irritation or other disturbances to one person, while hundreds of others working under exactly the same conditions would be entirely unaffected.

These experiences naturally led the employer toward a study of the physical condition of his employes, in order to direct each of them into that kind of employment for which he would seem best suited by virtue of his physical fitness as well as his experience and skill; and **vice versa,** to divert him from an employment that might prove injurious to his health and safety. In order to pursue this course intelligently, physical examination of all prospective employes and periodical re-examination of all persons already employed became necessary.

Bringing Evils to Light

Aside from looking after the health of individual employes, the physician in industry also renders a valuable service by bringing to light those general conditions of employment that may adversely affect the health and comfort of all workmen in common. Many of these conditions would otherwise remain concealed and unremedied because their ill effects are of such gradual development that the lay executive or employe might not be able to detect their presence nor locate their source. By his co-operation with the employer and foremen in securing wholesome ventilation and proper lighting conditions, and by inducing employes, by personal advice or through suitable literature to adopt healthful habits in the shop and home, the physician brings into play simple, far-reaching measures that tend to raise the health and therefore the efficiency standard of the entire working force.

The physician also finds specific functions to perform, such as the training of an adequate number of persons in each employment, so that they can themselves as laymen effectively treat slight wounds that do not demand a physician's service, or give temporary assistance in cases of serious injuries that need emergency attention pending the arrival of an ambulance or physician. The presence of such a body of trained first aid men is so much the more important when the industrial establishment is located at a considerable distance from the physician's office or dispensary, or when injuries occur when a physician is not immediately available.

With these many advantages in mind it is obvious that the physician has come into industry to stay. In a large plant he becomes part of the organization and devotes his entire time and effort to the welfare of its employes, while in smaller plants or in those where the work is practically free from hazard, he spends only a part of the day in the medical care of employes, or he combines a number of such plants under his medical supervision. Apart from the medical aspect, however, enlightened employers are beginning to see quite clearly the value of a physician as a staff member. They have learned to appreciate that his peculiar relationship to employes, as a friendly medical advisor, enables him to exert a wholesome influence upon their mental attitude as well as upon their physical welfare. It should therefore not be surprising to find in future, positions regularly attached to the organization of even small plants, where the medical supervision of employes alone would not be a task large enough to warrant the full time employment of a medical expert, but where his spare time may be used effectively in assisting the management in the general supervision of employes.

The physician in industrial practice encounters a great many tasks and problems that do not arise ordinarily in private practice. He often finds himself dealing with a great number of people whose needs must be met promptly, effectively and with a minimum expenditure of time. Many of these are unfamiliar with the English language and are unable to make their needs and wishes understood or to understand the inquiries and directions of the physician who speaks English only; others are mentally backward and difficult to deal with on that account. Some are unclean and careless in their personal habits, thereby causing their wounds or ailments to improve only very slowly even under

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the best of care, while others have a generally antagonistic attitude. Some are even dishonest and try to conceal or falsify the real cause of an injury; they would rather feign inability to work and secure part pay while loafing, than perform honest work and gain full wages. Moreover, there are those who themselves believe or by some doctors are led to believe, that they are seriously injured and incapacitated for work when they are not. Yet the physician in industry must patiently and persistently cope with all these conditions in his endeavor to cure these people of their physical ailments and to disabuse them of their mental illusions.

What He Must Solve

The question of where the physician in industry should terminate his care of injured or sick employes and at what point an employe's private physician should assume such responsibility, is another problem that must be solved in a satisfactory way. What duties to delegate or not to delegate to the nurse employed in the establishment under his supervision; what instructions to give and what materials to furnish to laymen authorized to render first aid or emergency treatment to injured employes throughout the plant; how best to render some industrial operations free from the hazard of occupational disease, or how to protect workmen against such hazards if they cannot be eliminated, are questions that he is called on to answer in an intelligent and practical manner.

In the solution of these and similar problems the physician in industry often finds himself in a quandary. Previous training and experience had made no specific provision for their solution; in fact, many of these problems have but recently become recognized. In most cases the physician in industry has been obliged to find an answer to each problem practically alone and as best he could. Sometimes he has hit on a method that was only partially satisfactory; sometimes he has achieved results that were all that could be desired, while at other times he has failed in his aim. Occasionally, through a comparison of conditions and an interchange of experiences, physicians connected with industrial enterprises would reach common conclusions that would point to simple and practical remedies. The value of such informal conferences naturally led to a desire for a more systematic interchange of ideas extending over a larger group of physicians dealing with medical problems in industries of diversified kinds. A preliminary meeting of physicians engaged in industrial practice held in New York City on April 4, 1914, indicated that their varied knowledge and experience could be so combined and harmonized as to afford composite and definite conclusions that would be valuable to themselves and to the industries they represent. It was also felt that the findings could advantageously be made available to all physicians in industry to the end that employers and employes generally might reap benefit therefrom. The concrete outcome of this meeting was the organization of a "Conference board of physicians in industrial practice," the scope and work of which is embodied in the official declaration, which is as follows:

> The conference board of physicians in industrial practice is organized for co-operative effort in introducing into industrial establishments the most effective measure for the treatment of injuries or ailments of employes; for promoting sanitary conditions in workshops; and for prevention of industrial diseases.

In launching this movement, the conference board on safety and sanitation has been a helpful factor, and the two boards have since been working in close, harmonious relationship; that of business executives looking for professional advice in safeguarding the health of employes, and that of physicians offering medical judgment as the result of combined study and experience.

It was thought desirable to bring together at first only a relatively small number of medical officers of corporations, so as to facilitate their work and give their discussions a more intimate character. In order to insure regular attendance at the meetings, only corporations in the eastern section of the country were asked to join the conference board through their respective medical officers, but industrial representation was diversified as far as practicable. The physicians now constituting the board are all men of wide experience in their respective fields, who have gained a thorough understanding of the requirements of industry from the humane viewpoint and of the physical ability of men and women generally to meet these requirements. They are also familiar with the personal habits and the living and working conditions of people engaged in industry, and are therefore particularly competent to handle medical problems in industry.

Work of the Board

The companies represented by these physicians employ over 250,000 men and women, skilled and unskilled, of many languages and nationalities, and working both indoors and out in greatly diversified occupations. The board meets periodically. So far eight meetings have been held and some important results have already been achieved; much other work of far-reaching character is now under consideration. The individual members of the board are actively co-operating in the prosecution of research work in respect to special problems which can be studied best in the particular industry with which they are connected. The results of individual investigations, however, are referred to the board for broad consideration and joint action.

Instructions to Laymen

One of the first tasks assumed by the board was the development of "instructions to laymen for first aid treatment of common injuries and disorders." It was the intention to issue instructions of such simple character that they could readily be followed by the ordinary man without even an elementary foundation of first aid knowledge. The instructions agreed upon by the board are concise and pertinent; they stipulate what the laymen should do, without wasting any words in stating the reasons for so doing. In an emergency treatment, loss of time by reading irrelevant matter may prove of serious consequence. The remedies referred to in the instructions are few, simple and inexpensive and can be administered by laymen without danger of any harm. All medicaments, bandages and other materials needed in carrying out the instructions, are readily obtainable in drug stores. The first aid instructions promulgated by the board have been widely accepted; they have also been reprinted in numerous technical journals in the United States and in other countries.

The board also co-operated in a very practical way with the conference board on safety and sanitation in the development of the N. A. S. O. standard first aid jar, a compact, sanitary and convenient first aid outfit consisting of a dust-proof glass jar in which first aid materials are contained in well ordered arrangement. The first aid instructions are printed on the inside of the glass jar cover and are therefore always at hand when needed. These first aid jars have been made readily available to employers and are now being used extensively in industrial establishments, in public institutions and private homes.

The next work of importance undertaken by the board was the determination of the essential requirements of "Physical Examination" in industry generally. This subject was given careful study with a view of arriving

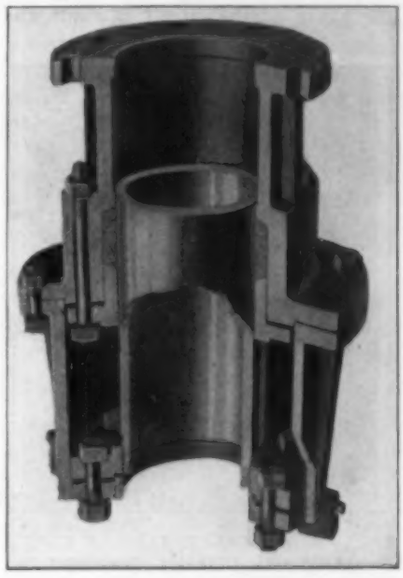
at a standard of minimum requirements and records which could be used in connection with practically all employments, or with such additions as the nature of a special employment would necessitate. The conclusions reached were based on extensive observation and experience in industry, through which it had been learned what physical ailments and what degree of such ailments would interfere with the well-being, efficiency and safety of the employes at work. The board agreed upon the various defects requiring attention in physical examinations, and the various degrees of such defects, on the basis of which the suitability of an individual for a specific employment can be determined. The board also standardized a "Physical Examination Record Card" of convenient size and so arranged that a sufficiently clear and comprehensive record can be made with a minimum amount of clerical work. These record cards have already been used in thousands of cases with entire satisfaction.

The board gave special attention to methods of "Artificial Respiration" of persons rendered unconscious by electric shock or by asphyxiation from water, smoke or gas. The board expressed itself unanimously in favor of the manual prone pressure method by persons specially instructed therein, but it also agreed that when mechanical devices for artificial respiration are used they should be used principally as auxiliary means and then only by specially instructed laymen or physicians.

Realizing that all efforts for sanitary conditions in workshops and for clean personal habits of persons while at work would be brought to naught if the persons themselves would not make similar efforts in respect to their homes and their personal habits outside the workshop, the board decided to prepare a set of "Health Hints" of prophylactic character, written in simple, concise and direct language, so that they can be readily understood by the average person. The care of the teeth and eyes, the healing of wounds, the value of proper breathing, the danger of promiscuous spitting, the cause of headache and of kidney trouble, are some of the subjects on which the board has prepared statements which are intended to be printed, each on a separate leaflet, for wide distribution among employes generally.

The conference board has also entered into a careful study of diseases peculiar to certain occupations, with a view of learning the most effective treatment of such diseases and the best methods of reducing or entirely eliminating their causes. Some members of the board who are connected with industrial establishments in which the nature of the work or the materials used are apt to cause such diseases, have become experts by special study and extend experience in this field of medical practice. With their assistance and with the help of other invited experts in this field the board is proceeding cautiously and painstakingly in the study of occupational diseases, and expects in due time, to arrive at and publish definite conclusions.

Another important phase of the work of the board is the exchange of



AN EXPANSION JOINT DESIGNED ON THE PRINCIPLE OF THE PISTON ROD, CROSSHEAD, GUIDES AND STUFFING BOX OF A STEAM ENGINE

specific experience by the members as they encounter special situations in industry, or as they come in practical contact with the administration of workmen's compensation laws. Many of the corporations represented on the board through their respective medical officers are operating in several states and are therefore subject to more or less widely differing workmen's compensation laws and health regulations. The necessity for uniformity in statutory provisions and in their interpretation has therefore been pertinently brought home to the board and has convinced it of the desirability and need of a standardized nomenclature and definition of medical terms as they relate to industrial work. The board realizes that progress along these lines will be slow, but it believes that substantial progress can be made by thorough investigation along broad lines and by close application to the task which they have before them. The conference board of physicians in industrial practice is unique in character and in method of work. It is a voluntary association of a small number of men engaged in the same field of professional work, who meet in periodic conferences of the most informal character, unfettered by any restricting rules and regulations or by any obligation to abide in their individual work by the conclusions of the board. Yet the common purpose which brings these physicians together and the absence of such restrictive regulations, has resulted in a most helpful co-operative effort. The work of the board members, while strictly governed by professional ethics and scientific principles, is given a most pronounced practical aspect from the fact that these physicians in industry have acquired by the nature of their work an industrial viewpoint and understanding that establishes the proper balance between what should be abstractly striven for and what can be concretely accomplished under actual working conditions.

A Crosshead-Guided Expansion Joint

An expansion joint embodying a principle similar to that of the piston rod, stuffing box, crosshead and guides of an ordinary steam engine has been developed by the Ross Heater & Mfg. Co., Inc., Buffalo, N. Y. The joint is designed to relieve pipe lines and fittings from stresses due to expansion and contraction.

The main casting, as shown in the accompanying illustration, is divided into two parts for the purpose of accessibility and is connected by flanges and bolts. The expansion or moving element consists of a long sleeve, made steam-tight by a stuffing box and gland. The sleeve is supported at the outer end by companion flanges, having a machined periphery for a sliding fit in the guide. The flanges slide freely in the guide, the internal surface of which is also machined to assure alignment. The crosshead principle relieves both the sleeve and packing from the weight of the pipe line and decreases the wear on the packing and consequent leakage. Tie bolts are embodied in the design to prevent the crosshead from being drawn out of the casing and the joint drawn apart.

The stuffing box is accessible by removing the bolts on the guide flange and sliding off the guide casing. The packing space of the stuffing box is roomy and may be packed with any kind of metallic or fibrous packing. This forms a steam-tight joint that

required practically no attention, but should the packing gland require drawing-up, this is done from the outside without disturbing any part of the fitting.

For pressures up to 150 pounds all parts with the exception of the sleeve are made of semi-steel. For higher pressures cast steel is used. As the inner area of the slipping section is equal to the area of the pipe and moves freely, a balance is secured in the joint which is said to relieve the stress that would otherwise be brought to bear on the flanges and the fittings.

These expansion joints are made for all standard sizes of pipe up to and including 24 inches. They are designed for pressure up to 200 pounds per square inch but will withstand even higher pressures.

Large Tank-Type Circuit Breakers

SOME interesting improvements have been made in tank-type circuit breakers built by the General Electric Co., Schenectady, N. Y. The principal changes have been introduced to make the breakers more accessible for inspection and repair. No radical departure in the design of the current carrying or operating parts has been considered necessary. A noteworthy change consists of mounting the breakers on a framework and in the handling of the tanks by a tank-lifting device.

Top connected circuit breakers shown in Fig. 2 are now self-contained for use on systems of potentials up to and including 200,000 volts. One tank with two breaks in series is used in each phase. The breakers are made for either automatic or non-automatic operation. The breakers may be closed by hand, solenoid or air. The automatic breakers are tripped under overload by series trip coils (mechanical trip is provided for indoor use only) or current transformers. In using these circuit breakers for hand operation, they can be installed behind the switchboard panel with the operating handle in front and connected to the breakers by connection rods and bell cranks. All the breakers can also be operated by a removable wooden lever connected directly to the mechanism. When solenoid or air-operated, the breakers may be located where desired and controled from the switchboard or other convenient place by a pull control switch or air valve.

The operating mechanism and bushings are secured to the cast iron cover of the heavy sheet-steel tank. Each bushing extends through the switch cover into the oil, and is so clamped to the cover that the throwing of oil is impossible. The bushings are easily removable and interchangeable.

There are two fixed contacts in each switch element between which one phase of the circuit is made and broken by a horizontal contact blade. Each contact blade is connected to the operating mechanism by a specially tested hard wooden rod, which passes through the cover of the switch in an insulating bushing. The stationary contacts consist of widely flared fingers and long arcing tips of drop-forged copper secured to the contact block by flat steel springs, copper laminations and screws. The contacts are always smooth and bright due to the sliding effect they are subjected to on opening and closing and the arrangement of burning tips.

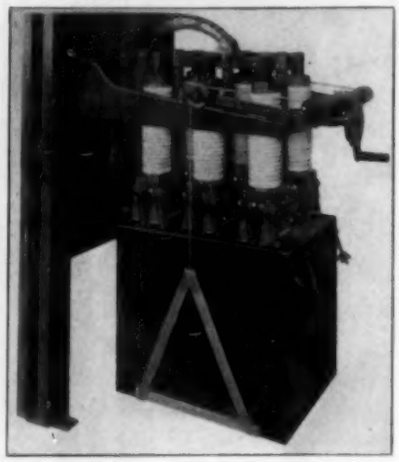


FIG. 1—OIL TANK PARTIALLY LIFTED OFF OIL CIRCUIT BREAKER

A 20,000-ampere direct-current circuit breaker, of the solenoid operated type, has been built recently by the same company. This breaker is one of four of the same capacity built for the Aluminum Co. of America for installation at Messena, N. Y. The closing and opening movements under normal conditions are controled by a single-pole double-throw control switch mounted remote from the breaker on the switchboard or in any other convenient location.

This company has also developed a number of tank lifting arrangements for oil switches of various forms and sizes. For medium-size switches the lifter, which is illustrated in Fig. 1, is employed. The simplicity of construction is evident from the photograph. The oil tanks can be lifted the entire distance between the switch frame and the floor. The method of operating the lifter is as follows: The apparatus is placed on the the switch frame and fastened by turning two wing nuts; the operating handle, connected to a worm gear, is turned until the two triangular tank supports engage the tank, which is then unfastened from the switch frame and lowered to the floor or to any intermediate position desired. The lifter is adapted to various sizes of the form of switch shown simply by moving the pulleys over which the cables run, slightly forward or back.

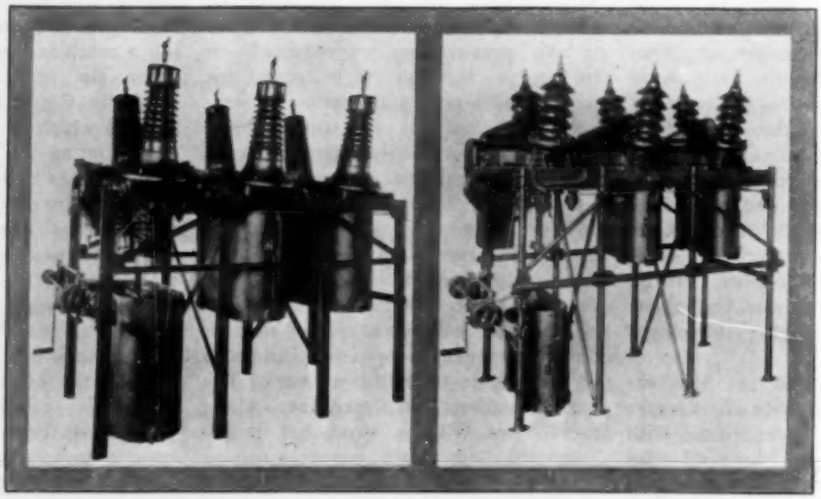


FIG. 2—TYPICAL OIL-BREAK CIRCUIT BREAKERS

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

What is Steel?

What is steel, that is, how would it be defined?

Like many other things well known by their properties the term steel is difficult to define briefly and correctly. Most definitions, unless unwieldy in length might apply as well to other forms of iron and the difficulty is in covering the entire range of points in which steel differs from cast iron, wrought iron and malleable cast iron. Steel contains less than 2.20 per cent carbon, usually less than 1.50 per cent; this distinguishes it from cast iron. It is produced in a fluid condition and is virtually free from slag, distinguishing it from wrought iron.

Bradley Stoughton defines steel as follows: "Iron which is malleable at least in one range of temperature and in addition is either cast into an initially malleable mass; is capable of hardening greatly by sudden cooling; or is both so cast and so capable of hardening." The first statement in this definition distinguishes steel from cast and pig iron, the second from malleable cast iron and the third from wrought iron.

Spot Welding

Please explain what is meant by spot welding and state its applications.

Spot welding is the fusing together of relatively thin metals by means of a single-phase alternating current, with the electrodes making a heavy contact pressure on the area being welded. It is adapted specially to sheet metal work ranging from the welding of fish plates to tram rails to the lightest of sections, such as the "sticking" of handles, etc., to oil cans and kitchen ware. The contacts cover a small area similar to that of a rivet, and the points pinch the two pieces together like a vise. A heavy current is then sent through this area and in a few moments produces a welding heat. The spot method takes the place of riveting, requires no punching of the material and is much quicker. It can be applied to most all kinds of metals and alloys, except that cast iron cannot be welded to cast iron.

Besides sticking sheets together, it is possible to heat and head rivets when set in the holes, and to draw the temper of spots on hardened sheets. The process is a valuable aid to fabrication and repair work in the steel industry. The apparatus is available in standard units which can be used without licenses or royalties.

Refining Zinc Waste

Can you tell us how to remelt our scrap zinc and make it good? Also how can we remelt low grade spelter and make it high grade? By high grade we mean the standard specifications as follows: The spelter shall not contain over 0.07 per cent lead, 0.03 per cent iron, and 0.05 per cent cadmium.

We are sorry to say that scrap zinc cannot be refined by a simple and inexpensive remelting process, though some of it may be recovered in this way. There are three processes whereby scrap zinc or ingot metal may be refined: Distillation, liquation and electrolytic deposition. The distillation method requires the use of a closed retort and a condenser. The zinc skimmings and shot are mixed with zinc ore and the zinc recovered and refined. A reverberatory furnace is used for the liquation process. This is a combination of the melting and separating processes, and it must be followed by distillation in order to produce the highest grade of zinc. The electrical processes are probably the best, if the work can be done on a large scale and low priced power is available. Unless you have very large quantities of scrap to be refined, your best solution of the problem is to sell the scrap to the nearest refiner.

Premium Explained

Why are users of basic iron willing to pay a premium for northern makes over southern basic?

This is because of the phosphorus contents. Southern basic iron contains on the average, about 0.85 per cent phosphorus, while northern basic contains only about 0.15 per cent phosphorus. In working the iron, it can be easily seen that considerable more time and expense are incurred to eliminate the phosphorus from southern basic than from northern basic. As the result, melters are usually willing to pay at least $1 a ton premium for northern iron rather than to experience the trouble and expense of eliminating the extra phosphorus from southern iron. The premium paid is usually around $1 a ton for northern iron, but some melters will pay more and some will not pay that much, depending upon the grade desired for the article which is to be the final product of the melting process.

Open Hearth Production

Will you kindly advise use the number of tons of open-hearth steel produced during the years 1913, 1914, 1915 *and* 1916? *We would also like to know what was the production in* 1915 *of sheets of such thinness as would warrant the addition of ferro-phosphorus to the melt before rolling.*

The production of open-hearth steel in recent years was as follows: 1913, 21,599,931 tons; 1914, 17,174,684 tons; 1915, 23,679,102 tons, and 1916, estimated at more than 30,000,000 tons. Regarding the production of sheets, 160,209 tons of black sheets, No. 12 gage and thicker, and 1,676,577 tons, No. 13 gage and thinner, were produced in 1915. In the same year, 1,093,345 tons of black plates for tinning were rolled on tin mills and 269,512 tons of other black plates and specialties were produced. The total black sheet production was 1,836,786 tons and the black plate production was 1,362,857 tons.

Thermal Reactions of Cast Iron

The Various Phenomena of Expansion and Contraction of Cast Iron at Different Stages of Cooling Are Concisely Explained in This Article

BY THOMAS TURNER

ADOPTING the time honored language of Lord Macaulay, it may be assumed that "every school boy knows" that substances when heated expand, and with every increment of temperature there is a corresponding increase of volume. Conversely when any material is cooled there is a corresponding diminution of volume, the amount of such contraction per unit of temperature depending upon the inherent properties of the material. But though it is true that over a short range of temperature the change of volume is strictly proportional to the change of temperature, it is not strictly true over wide ranges of temperature. Solids, for example, have a higher rate of expansion when near their melting points than at lower temperatures. Further, in very many instances, accurate observations show that there are distinct irregularities, and that these are indications of important physical, allotropic, or chemical changes which occur at certain definite temperatures. It is noteworthy that two of the most important substances with which we have to do, namely, water and cast iron, show remarkable interruptions in their rate of contraction when cooling—in fact actual and marked expansion takes place. The profound and beneficial influences which result in the climatic conditions of our globe, from the expansion of water when changing to ice, are well known to all geographers. The inconveniences which accompany such advantages, are known to the householder and the engineer. The expansion of cast iron during, and shortly after, solidification has the great advantage of rendering the metal specially suitable for giving a perfect reproduction of the desired pattern. But this advantage is accompanied by troubles which beset the foundryman, and which often lead to the production of castings that are warped or bent, or which spontaneously crack after being allowed to cool.

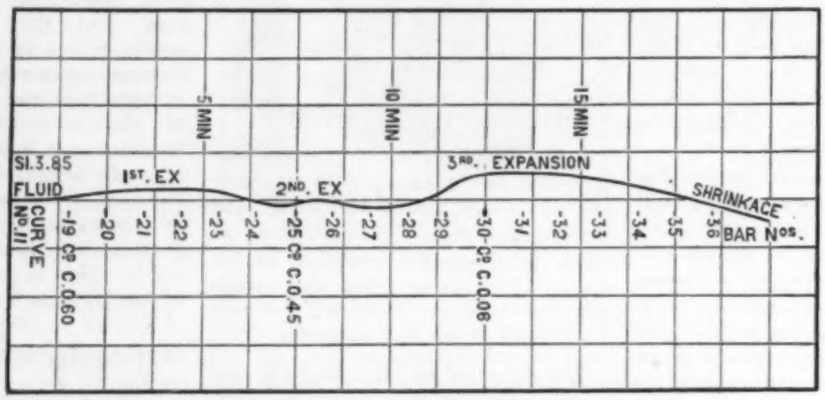


FIG. 1—CURVE SHOWING RESULTS OF KEEP'S TESTS

In comparing water with cast iron, a marked difference in constitution is observed. To the chemist, water is a compound, composed of oxygen and hydrogen, yet physically it is all one thing; one "component" or one "individual". So long as it is liquid it is one "phase." When water passes into ice we have another phase, while water vapor is a third phase. With the gaseous phase we are not interested at present, and it introduces the further variant of pressure. Considering only the liquid and solid phases, if these be mixed together in any proportion and kept at exactly 0 degrees Cent., no change will occur in the weight of ice or of water. But if the temperature be raised, and sufficient time given, the whole of the ice will melt; if the temperature be lowered, and sufficient time given, the whole of the water will freeze. Hence there is only one temperature at which the two phases can remain in equilibrium. With a falling temperature, no matter how many phases may be present, only one phase can separate at one time.

Cast iron is not an element, or a compound, or a solution, but a heterogeneous mixture, including a number of "individuals" or "components." The elements which are always present are carbon, silicon, sulphur, phosphorus and manganese. Variable small quantities of other elements are also to be detected. The actual substances in cast iron include iron (or ferrite), carbon, iron carbide (Fe_3C), iron silicide (Fe_2Si), iron sulphide (FeS), iron phosphide (Fe_3P), and manganese sulphide (MnS). There are mixtures of the foregoing, yielding eutectics, such as the iron carbide eutectic with 4.3 per cent of carbon, the iron-carbon-phosphorus eutectic with 2 per cent carbon and 6.7 phosphorus. There is also pearlite with 0.9 per cent carbon. There are also solid solutions, such as silico-ferrite which has the same crystalline habit, or is isomorphous with iron. It therefore is not enough merely to know the ultimate chemical composition of our cast iron. We must know in what form the elements are present, and how they are arranged. Having so complex a structure and composition, in the solid cast iron, the question naturally arises—Do these substances exist in the separate state from the beginning, or is there a definite and sequence of formation? A generation ago no satisfactory answer could have been given to such an inquiry. The use of the microscope and the pyrometer, and the application of the "phase rule", have done much to make clear what really occurs. When cast iron commences to solidify, the carbon, silicon, phosphorus and other elements are in a state of solution. Any separation which occurs, takes place afterwards as the metal cools. It takes place in definite order and at definite temperatures. So long as the temperature is falling, and sufficient time is given for equilibrium to be attained, only one phase can separate out at a time. If there is a fixed temperature at any point during the process of cooling, then two substances may separate out together and yield an eutectic. In no case can more than two phases separate out together. It has been found that the condition stated, is true

A paper presented at the Cleveland meeting of the American Foundrymen's Association. The author is professor of metallurgy, University of Birmingham, England.

only so long as sufficient time is given for equilibrium to be attained. In a large casting, which is cooled very slowly, we approximate to equilibrium conditions. But in many cases the cooling is so rapid that one separation is not completed before the temperature is reached at which another begins. We have thus an overlapping or lag, and with extremely rapid cooling changes may be altogether suppressed. In such cases heat which would otherwise have been evolved is retained in the solid, and the result is called metastable. Metastable solids are often hard and brittle, like glass, or white cast iron. By annealing at a proper temperature, the heat which has been retained internally is allowed to change its form, and to be liberated; the condition of equilibrium is attained, and the solid becomes relatively soft.

Returning now to the subject of expansion in cast iron, it may be noted that practical men were convinced that expansions occurred long before there were any scientific observations to support that view. These preliminary observations did not carry us beyond the point at which the metal became solid in the mold. Nor was attention given to the influence exerted by the various elements which are present, in widely different proportions, in different samples of gray cast iron.

Really accurate and useful knowledge on this branch of the subject may be said to commence with the work of W. J. Keep, of Detroit, who introduced an apparatus for automatically recording the changes of length in a sand cast bar from the moment it begins to solidify until it is cold in the mold. By modifications of this method, and with the addition of temperature measurements, the question has been since more fully investigated, in my laboratory. The observations have not been confined to cast iron, but have been extended to brass, bronze and other alloys.

A fundamental experiment by Mr. Keep calls for special mention. A number of similar bars were poured from the same ladle, side by side, at the same time. From one of these an autographic record of changes of length was obtained. The others were quenched, one at a time, at regular intervals during cooling. The quenched bars were afterwards analyzed. The results are represented in Fig. 1. The metal was a gray phosphoric cast iron, containing 3.85 per cent silicon. It showed three distinct expansions, which reached their respective maxima at about four minutes, eight minutes and 14 minutes after casting. It was not until about 20 minutes after pouring that regular contraction commenced. The combined carbon had fallen, during these expansions from 0.60 to 0.06 per cent in the chilled bars.

Mr. Keep's work was of importance not only because it showed the nature and sequence of the expansions which take place, but also on account of its suggestiveness for further inquiry.

The questions which naturally arose were those of dealing with the cause or causes of the expansions, the thermal changes which occurred, and the changes

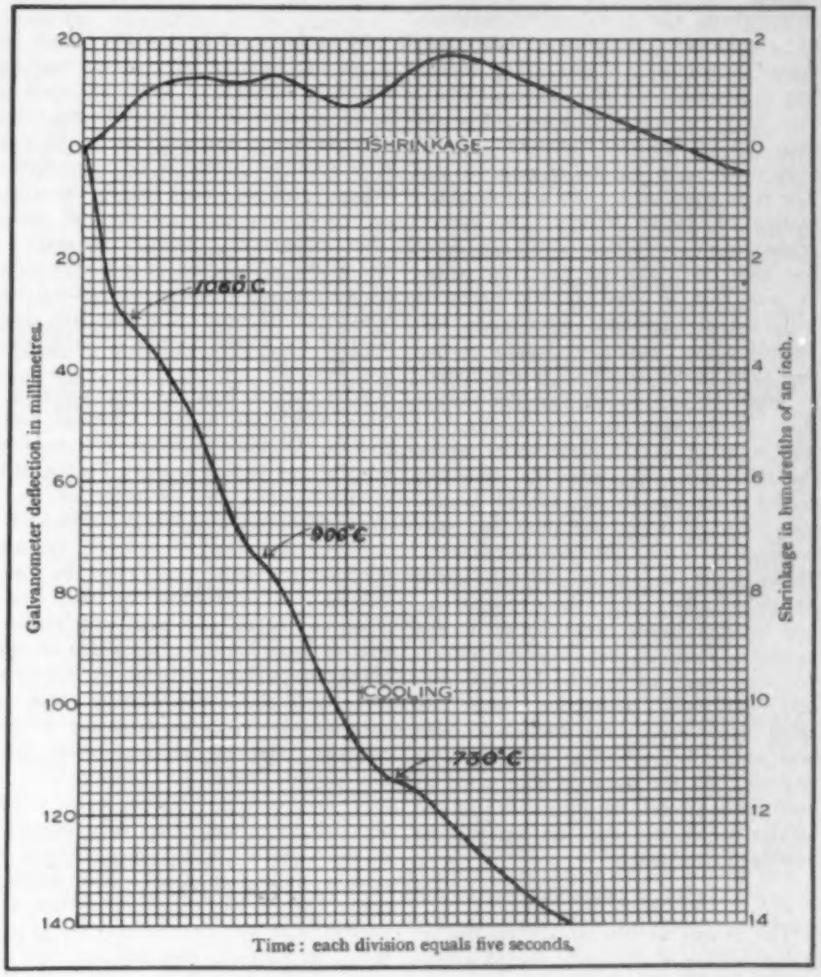


FIG. 2—EXPANSION AND TEMPERATURE CURVES FOR GRAY PHOSPHORIC IRON

in structure and properties which resulted therefrom. In the investigations which ensued I was fortunate in having the assistance of Dr. O. F. Hudson. Among the facts ascertained were the following:

1.—That most metals and a number of alloys give a regular contraction in the cast bar.

2.—That with white cast iron, free from phosphorus, there is only one small expansion, and one temperature arrest, which occurs at about 670 degrees Cent.

3.—That with gray cast iron, free from phosphorus, there are two well marked expansions, and two distinct temperature arrests, which occur at about 1,135 and 695 degrees Cent., respectively.

4.—That with increase of silicon these arrest points occur at higher temperatures, and nearer together. In other words, though both are raised, the lower, or pearlite point, is raised more than the upper, or iron carbide eutectic point.

5.—That the addition of a small quantity of manganese, together with silicon, diminishes the rise in the pearlite point, and leads to a more complete decomposition of the pearlite carbide, in other words to the production of fine grained graphite from the combined carbon.

6.—That in gray irons containing phosphorus there is an additional, or third arrest, which occurs at a temperature between those given, or at about 900 degrees Cent. A typical expansion curve, and the corresponding temperature curve for gray phosphoric iron is given in Fig. 2.

There are doubtless other volume changes besides those that have been mentioned. These include what occurs when silicon dissolves in iron to yield the solid solution known as silico-ferrite. The separation of manganese sulphide, and iron sulphide, during the cooling of cast iron, doubtless also produces volume changes though such changes are be-

lieved to be relatively unimportant. The most important of the conclusions which were derived from the experiments conducted at the University of Birmingham, have since been confirmed by other investigations, employing various forms of apparatus. Special mention should be made of the careful work of Prof. Wust, of Aachen, and the practical applications by Messerschmitt. More recently Mr. Heggie, of Birmingham, who is a foundry manager of considerable experience, has conducted a number of tests. The object was to ascertain whether in actual practice, with varying thicknesses of castings, the expansions followed in the same order as in my earlier experiments. The tests were made with a rectangular casting of special pattern. It was a frame, made with thin ends, and with one side much thicker than the other. It was cast in sand in the ordinary way, but arrangements were made for recording the changes of length of the two sides during cooling. It was found, as might be anticipated, that the expansions in the thin bar were similar to, and occurred in the same order as in the thick bar. But since the thin bar cooled more rapidly, its second expansion occurred while the thick bar was contracting after its first expansion. Hence while one side of the frame was expanding the other was contracting, and internal strains were set up in the casting. Positive and negative effects followed, until at length the thin side was uniformly contracting, after its third expansion, while the thick side was markedly expanding at about 700 degrees. As the metal is quite solid at such temperatures, the importance of the strains which are thus set up will be readily appreciated.

Effects of Chilling

The arrests in the rate of cooling of a hot body, are obviously due to evolutions of heat at a given temperature or temperatures. These evolutions during cooling are merely the converse of heat absorptions during heating. A body which cools down in this irregular manner does not heat up uniformly. In practice it is much more easy to detect arrests during the cooling of a casting, than while heating up in the cupola. But there can be no doubt that the one is the converse of the other. If cast iron is chilled and the transformations are suppressed, heat is stored up in the solid. Hence it would save fuel in remelting if the iron were chilled as it comes from the furnace, instead of being cast in sand in the usual manner. The absence of sand on the surface is another incidental advantage. On the other hand the iron founder cannot judge of the character of the iron by fracture if it has been so chilled. It is also held, though I know not upon what scientific evidence, that metal which has been chilled retains some of its acquired hardness when remelted. It would scarcely be anticipated that such a result would follow, but it would be rash to contradict the opinion of a practical man without the support of a series of very carefully conducted tests.

Formation of Graphite

An evolution of heat which causes an arrest in the rate of cooling, may be due to a change in state, as when a liquid is converted to a solid, and parts with its latent heat of fusion. It may arise from an allotropic or polymorphic change, such as those which occur in pure iron, in iron sulphide, and many other substances. Thirdly, it may be due to the splitting up of a combination, the formation of which necessitated the absorption of heat. To this last class most of the changes which occur in cast iron belong.

With carbon, iron unites to form carbides which are definite chemical compounds. Of these Fe_3C was first isolated by Abel and is well known: Fe_2C is also accepted, while the existence of Fe_4C and FeC is also suggested.

Within the range of ordinary furnace temperatures only Fe_3C need be considered. It is formed by the direct union of carbon and iron, with absorption of heat. It is more stable as the temperature rises. Hence at temperatures well above the melting point of cast iron it shows no tendency to decompose. But as the temperature falls the carbide tends to decompose into iron and carbon. Hence irons which are rich in carbon often yield graphite, in the form of "kish" when allowed to remain fluid just above their melting point. When only iron and carbon are present 4.25 per cent of carbon is retained in solution, and this solidifies as an iron, iron-carbide eutectic at about 1130 degrees Cent. If the temperature falls rapidly the carbide may not have time to decompose, and white iron results. If, however, the cast iron is kept for a lengthened period at, or above, 1000 degrees Cent., the carbide decomposes and graphite is produced. The resultant is a gray iron, which may still contain carbide equal to 0.09 per cent of carbon. This residue may almost completely decompose, with further evolution of heat, at about 700 degrees Cent. One hundred volumes of carbide, if completely decomposed into iron and graphite expand to 113 volumes. The presence of silicon lowers the solubility of carbon, hence the total carbon is lower, and the formation of graphite is facilitated. The complete decomposition of the carbide is assisted by the presence of a small quantity of manganese. These facts will explain the two temperature arrests, and the two expansions observed with non-phosphoric gray cast irons.

Iron and phosphorus unite to form several definite phosphides but only Fe_3P will be here mentioned. The phosphide becomes more stable as the temperature rises, hence steel cannot be dephosphorized if the temperature is too high.

The iron, iron-phosphide eutectic, which corresponds with the iron carbide eutectic, contains 10.2 per cent of phosphorus and melts at 980 degrees Cent. In gray cast iron this binary eutectic combines with carbon to form a ternary eutectic, containing about 2 per cent of carbon, 6.7 per cent of phosphorus, and 91.3 per cent of iron. The triple eutectic solidifies at about 943 degrees Cent. and is the last portion of the casting to become solid. If the iron is very gray, the triple eutectic parts with its carbon, yielding graphite and the binary eutectic. The latter exists in the form of cells of irregular shape which are easily recognized under the microscope.

These facts account for the evolution of heat, and the expansion, which takes place with ordinary gray cast iron, at or somewhat above 900 degrees Cent.

While the three thermal reactions, just described, are undoubtedly the most important of those which occur during the heating or cooling of cast iron, there are others which are worthy of further investigation. We have for example the formation of silico-ferrite, and of silico-graphite, which appear to be of importance but of which little is known. There are also the reactions of manganese, and those of sulphur, both of which would doubtless repay further study. Though our knowledge of the subject has almost immeasurably increased during a generation, there are still untrodden fields for those who follow.

Russian Manganese

Russia takes the first place among the countries supplying manganese ore according to a statement made by M. Stromberg, editor of the *Journal of the Russian-American Chamber of Commerce*. In the decade terminating in 1912, Russia supplied 37 per cent of the total production, British India following with a production of 20 per cent. Manganese is one of the principal articles of Russian export to the United States.

The principal mining district in Russia is the Caucasus which yields on an average of 600,378 tons a year. The Nikopol district is second in importance, yielding approximately 195,000 tons a year.

Why Alabama Irons Are Valuable

Many Articles Have Been Written About Southern Irons, But Few Throw Much Light on the Uses of These Irons in Mixtures—The Author of This Article Gives His Reasons for Faith in the Alabama Product

BY Y. A. DYER

THE question is often asked: "Why are southern irons valuable—practically indispensable—in foundry mixtures where a combination of fluidity, toughness, strength, machinability and minimum shrinkage are desired?" One who is familiar with the chemical reactions of the constituent elements of pig iron in a cupola mixture will recognize at a glance from analyses of pig irons shown on page 786, why Alabama irons are valuable; and from the analyses of raw materials, why Alabama furnaces are able to produce most any desirable analysis iron for foundry work. As climatic conditions and sectional environment reflect their peculiar influence on human and vegetable life—so do these agencies reflect their peculiar influence on physical conditions with reference to mineral deposits and plant operations. Therefore, there is no doubting the fact that these laws of nature have their relative bearing on the physical properties of southern ores and southern irons—but as yet they have not been clearly deduced in the laboratory. However, the chemical properties form the true basis on which to figure accurately foundry mixtures for the cupola; and it is to these well balanced component elements — gained from the characteristics of southern ores — that southern foundry irons largely owe their individuality. Take for example, southern self-fluxing red ore. From a chemical standpoint, it is a well known fact that an ore with an inherent flux will more uniformly—truer to nature—flux itself than when artificial flux has to be used. The same is true as to the acquisition of silicon by the use of a siliceous ore. The chemical reactions in the furnace are not so violent and devitalizing in adjusting themselves. As applied to the operation of a cupola—the principle is the same as an iron with proper inherent manganese being far superior for a mixture to an iron with which has to be added ferro-manganese in order to bring that element up in the metal to the desired point. It is well known that manganese in the iron will lose from 25 to 35 per cent less through the cupola, as compared with the use of ferro-manganese, and will mix more uniformly and homogeneously with the metal, from the fact that there is a natural adjustment of the elements instead of violent and fluctuating chemical reactions. The distinctiveness of southern iron, therefore, is due to the well-balanced non-ferrous elements in the ores used; and by reason of their inherent existence in the ores, chemical reactions in the furnace so adjust themselves as to preclude excessive oxidations and induce proper deposition.

Table I.

Analyses of Typical Southern Ores

	Red ore. per cent.	Brown ore. per cent.	Special Brown ore. per cent.
Metallic iron	35.00-39.00	45.00-50.00	45.00-50.00
Insolubles	12.00-15.00	18.00-21.00	18.00-21.00
Lime oxide	15.00-17.00	.....	.....
Sulphur	0.001-0.005	0.001-0.005	0.001-0.005
Phosphorus	0.20 -0.40	0.40 -0.60	0.15 -0.20
Manganese	0.20 -0.25	0.30 -0.50	1.00 -1.50

Alabama foundry irons, as produced in what is known as the Birmingham zone, are made from red and brown hematite ores of basic element—some brands exclusively from red ores (hard and soft); some from three-quarters red ore and one-quarter brown ore; some from half red ore and half brown ore; and some from one-quarter or one-eighth red ore, balance brown ore. Table I gives fair average analyses of these ores.

Bearing in mind the fact that a furnace is only a giant cupola, and that its mixtures work on the same principle as a cupola, it is an easy matter for a foundryman to figure the class or analysis of iron that will be produced from a mixture of above ores. Therefore, with this fact in mind, it is of value to the foundryman—in the purchase of his southern iron—to know what percentages of each ore the various furnaces in the Birmingham district use in their mixtures; for the quality of the iron produced depends on their ratios. As will be noted, the brown ore carries a higher percentage of siliceous matter than the red ore—which tends to bring the silicon up in the iron; the red ore carries its own flux, while the brown ore carries none. It is the natural blending of the elements in the two ores that particularly characterize Alabama irons. It is well known that an iron made from a large percentage of brown ore will be stronger, tougher and cleaner in every way than that produced from a large percentage of red ore; and that an iron produced from a large percentage of the special brown ore is exceptionally strong and tough by reason of the high manganese and low phosphorus. On account of the limited tonnage of the last named brown ore, the output of this special analysis iron is comparatively small. It is more or less a "laxative" for regular gray iron mixtures; and is used as a base metal in semi-steel mixtures.

As illustrative of the quality of Alabama irons as produced from the ores mentioned above, each element will be dealt with separately. By reason of the composition of blast furnace slag, there will be practically no gain or loss of phosphorus from the use of the ores. The manganese will lose about one-third through the furnace—depending on furnace temperatures and basicity of slag. The sulphur in the ore is practically nil—so the coke used as fuel rules the sulphur content in the iron produced—which is regulated by proper fluxing, furnace temperatures and slag ratio; and by not using cokes in the furnace much above 1.00 per cent in sulphur. The silicon is gained from the siliceous matter of the ore, and controlled by furnace temperatures and slag. The carbon is gained from the coke and furnace gases, and controlled by furnace temperatures, rate of driving and reducibility of ores. With well regulated furnaces in the district, the silicon in the iron will range from 1.00 to 3.75 per cent in foundry grades, the total carbon from 3.25 to 3.90 per cent, and sulphur from 0.015 to 0.075 per cent. Therefore, the two important elements—phosphorus and manganese—in the pig iron owe their presence to

the quantity present in the ores used. As an exemplary mixture, figure the red ore alone in a mixture: It requires from 2.40 to 2.45 tons of this ore to produce a ton of iron—therefore, the phosphorus in the iron will be between 0.50 and 0.90 per cent, and the manganese betwen 0.30 and 0.40 per cent. It requires from 2.00 to 2.05 tons of brown ore to produce a ton of iron—therefore, with a mixture of all brown ore the phosphorus in the iron will show 0.80 to 1.20 per cent, and manganese from 0.40 to 0.65 per cent. With a mixture of three-quarters red ore and one-quarter brown ore, the phosphorus in the iron will show 0.70 to 0.80 per cent, and the manganese from 0.30 to 0.40 per cent. By the use of the special brown ore alone, or from a half to three-quarters of it, remainder red ore, the iron will show phosphorus 0.50 to 0.75 per cent, and the manganese from 0.75 to 1.50 per cent.

Properties of Southern Iron

The following table represents well established standard grading for Alabama pig iron:

Grade.	Silicon, per cent.	Sulphur, under, per cent.
No. 1 Soft	3.00-3.74	0.035
No. 1 Foundry	2.75-3.74	0.035
No. 2 Soft	2.50-3.24	0.040
No. 2 Foundry	2.25-2.74	0.040
No. 3 Foundry	1.75-2.24	0.065
No. 4 Foundry	1.25-1.74	0.075
Gray forge	.75-1.24	0.090

The phosphorus and manganese have no bearing on the grading, except in the case of special analysis iron.

As illustrative of the peculiarities and deceptiveness of fracture grading of southern irons, reference is made to two brands of Alabama iron—Clifton and Woodward. By reason of the high manganese and low sulphur in the Clifton iron, the fracture, many times, will indicate a much lower silicon when compared with ordinary southern irons, yet by analysis this iron will grade higher on a lower silicon than ordinary southern iron. The manganese in the iron neutralizes the sulphur and closes the grain; and for that reason many an old foundryman mistakes the appearance as to fracture. In the case of the Woodward iron, silicon as low as 1.75 to 2.00 per cent will fracture No. 2 foundry by reason of the exceptionally low sulphur and high carbon; and No. 2 foundry Woodward iron will show a higher silicon content than the No. 2 soft grade. These peculiarities go to accentuate the importance of purchasing southern iron strictly by analysis—for, after all, it is the chemical analysis that properly grades the iron. To the foundryman, it is all important to know what effect the elements of pig iron exert on the metal of a casting. These non-metals or impurities, as they are termed—totaling from 7 to 8 per cent—are the constituents that classify pig or cast iron, and it is these alone that have to be dealt with in mixtures.

First of importance is carbon—which is the real life of cast iron. The total carbon in Alabama irons range from 3.25 to 3.90 per cent. The important forms of this carbon are graphitic (open, flakey grain) and combined (close texture). The percentage of graphitic carbon increases as the silicon in the iron runs up, and the percentage of combined carbon increases as the silicon runs down. In southern irons, the happy medium seems to be reached—for a strong, tough, easily machined casting—when the graphitic carbon shows 3.00 per cent and combined carbon 0.50 per cent. Carbon is the base around which the other elements, silicon, sulphur, phosphorus and manganese, work—each having its direct, or indirect influence on it.

The silicon acts as a softener, and is the pivotal element in the determination of the nature of the carbon. High silicon irons show high graphitic carbon—the iron being open grained and weak. Low silicon iron shows high combined carbon — the iron being close grained and strong. Southern irons lower in silicon and higher in combined carbon than northern irons will produce castings tougher, yet more easily machined.

Sulphur, of course, is a detriment, and should always be kept as low as possible for machinery work. Southern irons generally are low in sulphur. Its action on the carbon is to turn it to the combined state—producing hardness and brittleness.

Phosphorus, indirectly, has its effect on the carbon—leaning to the graphic state, by reason of permitting the iron to remain hot a longer time; therefore, has its invaluable use in mixtures for sharp impressioned work, and castings that require the metal to run a long distance before solidifying—such as stove plate, radiators, enamelware and pipe. Southern irons have a wide range in phosphorus specifications—from 0.50 to 1.50 per cent.

Use of Manganese

Manganese has a dual effect on the carbon—both a softener and a hardener—yet it is a wonderful agency when used in the right proportions. Its tendency is to close the grain of the iron—both by its neutralizing effect on the sulphur and its effect on the carbon, by turning it to the combined state. However, in its action on the carbon, the effect is to add toughness. Manganese is also a penance for occluded gases, and a powerful flux. Southern irons have a wide range in manganese—from 0.25 to 1.50 per cent.

In the successful production of castings there is a well defined limit for each element in different kinds of work, and it is necessary for the foundryman to know how to apportion these elements by mixture in order to produce a well balanced casting. In the use of southern irons, there are no barriers with respect to obtaining a casting of any desired analysis for foundry castings—for the list of brands and analyses of Alabama irons shows an exceptionally elastic limit with reference to the elements. In short, Alabama irons are a panacea for the "ills to which foundry mixtures are heir."

Coke Oven Accidents in the United States During 1915

Reports received from the operators of coke ovens by Albert H. Fay, bureau of mines, Washington, show a gratifying decrease in the number of fatalities and injuries during the year 1915 as compared with 1913 and 1914. The number of men killed in 1915 was 38 as compared with 45 in 1914, and 46 in 1913. The total number of men reported employed for 1915 was 31,060 as compared with 22,313 in 1914. The fatality rate in 1914 was 2.02 per 1,000 while in 1915 it was 1.22. The injury rate in 1914 was 98.10 per 1,000 while in 1915 it was 91.82 per 1,000 men employed. Of the total number of nonfatal injuries, none were reported as causing permanent total disability while 50 were reported as causing permanent partial disability. The report represents 248 plants or companies showing 55,112 ovens in operation as compared with 49,895 in 1914. Some companies rendered combined reports for several plants so that the exact number of plants which were in operation is not known.

There were reported 98 plants idle. The average number of days active in 1915 was 303 as compared with 286 in 1914, and 288 in 1913. Although the accident figures thus collected are not quite complete for the entire industry, yet they are sufficiently representative to point out some of the principal hazards of the industry. This report gives for the first time separate accident data for beehive and by-product ovens and indicates a greater hazard for the latter than the former.

Copies of this report may be had upon application to the bureau of mines.

British Iron and Steel Institute

Had Exceptionally Interesting Meeting—Discussions by Distinguished Scientists Related Closely to the War—British Specifications for Phosphorus and Sulphur in Munitions Assailed

THE recent meeting in London of the Iron and Steel Institute, the great British organization, was of unusual interest on account of the discussions closely connected with the war. A feature of the meeting was the paying of enthusiastic tribute by Sir Robert Hadfield and others to Prof. Henry M. Howe, the distinguished American metallurgist. Prof. Howe was unable to be present, but his paper was read and discussed. Of even greater interest was the letter recently received from him by Sir Robert Hadfield. In this letter, Prof. Howe said he thought the result of the war would be that the Teutons would dethrone the dynasty or reduce it to a limited monarchy and he also stated that they would begin where the Anglo-Saxon race began when the barons upset King John. "So far," he said, "the Germans have never reached that stage of political evolution." Prof. Howe added that the news received was as good as possible and the only thing he feared was the too early termination of the war before the Germans had become so thoroughly dissatisfied as to dethrone their dynasty.

The meeting was attended by Joseph Horton, associate editor of *The Iron Trade Review*, Birmingham, Eng., and his report was held for a number of days and carefully scrutinized by the censors, but was finally approved and forwarded. The report follows:

The autumn meeting of the Iron and Steel Institute was held in London on Sept. 21 and 22 at the Institution of Civil Engineers, Westminster. Owing to the large demands of the war, the attendance was somewhat smaller than usual. Many of the younger members are still in khaki, while many works managers and proprietors are solely engrossed in the patriotic duty of maximum production of war material, and have no time to attend technical meetings. A few members who have temporarily forsaken science for the army were present in uniform. The war may be said to have colored the whole of the discussions. Part of the inspiration of Dr. Stead's paper arose from the alleged rejection of war material, owing to infinitesimal departures from specifications, such requirements, it was said, having their origin in obsolete ideas as to the influence of such elements as phosphorus and sulphur. By some, Dr. Stead's paper was welcomed as indicating a new and more intelligent attitude towards these highly controversial elements. But the old school of thought found capable defenders. Like all technical societies, the Iron and Steel Institute is being spurred on to a bolder policy by the war, and important proposals intended to increase the membership and widen the scope of work will be found detailed below.

Formation of Committees

The president, Sir. William Beardmore, introduced a recommendation by the council, that with a view to encourage members of the institute to take increased interest in its affairs, committees be formed to report on new developments in the industry and to assist in obtaining practical papers thereon. Such committees might be five in number, dealing respectively with (a) mining, fuel, refractories; (b) pig iron, foundry practice; (c) steel and alloys; (d) mechanical treatment; (e) physics, chemistry, microscopy. In addition to these committees, a research committee might be formed for the purpose of suggesting and advising on subjects suitable for investigation and research.

It was also recommended that a new class of members be formed to be called the associate class, to include students of metallurgy at a university or college, pupils or apprentices to metallurgists or engineers or in metallurgical or engineering works and persons employed in some practical or scientific capacity or in a metallurgical or engineering works. Associates are to pay an annual subscription of one guinea and will be exempt from payment of an entrance fee.

M. Mannaberg said the facts given by Dr. Stead were well known to steelmakers. Phosphorus was not such a great enemy as was made out. But specifications were prepared by constructive engineers, and had to be complied with, and shell steel had to be made with lower phosphorus and sulphur than was really necessary. It was not necessary to reject tin plate steel because of traces of tin in the steel as some makers did. Neither was copper injurious, as was commonly supposed. He endorsed every word of the paper.

Sir Robert Hadfield thought another term should be used for "annealing", a name which was played out. From its Anglo-Saxon origin "annealing" meant to "set on fire" or "to burn". The French and German equivalents were equally unsatisfactory, and a word was needed to convey the idea of heat treatment. The speaker showed how by heat treatment of steel he met a specification requiring 40 to 50 tons breaking load and 22 per cent elongation in projectile steel. That would have been impossible without heat treatment. It was a great aid to uniformity. He did not agree with Dr. Stead on the question of phosphorus. No doubt they could use higher phosphorus with lower carbon, but he should not like it to go forth from the institute that it was safe to use high sulphur and phosphorus. With phosphorus up to 0.08 or 0.09, they would be more likely to get the steel burnt. Similarly a reduction of phosphorus reduced that liability. Yet it was undoubtedly possible with medium carbon and high phosphorus to get very excellent results. The French largely believed in making their shell steel by quenching and re-heating. No doubt that helped to wipe out the effect of over-heating or large crystallization. Phosphorus, in particular, had a tendency to increase the size of the crystals, and the larger the crystals, especially with high carbons, the weaker the steel would become. They might fire out many shells all right, but with one bad shell the re-

sult might be too terrible to contemplate. He once got by heat treatment excellent results from steel containing 0.14 phosphorus with 0.2 of carbon. But Sheffield makers of high quality tool steel insisted that it was necessary to keep down the phosphorus because when they came to harden steel, especially projectile steel, the evil effects of phosphorus were brought out.

Timely Discussion

C. H. Ridsdale said such a paper as that of Dr. Stead had long been needed and it was time to review their position and see whether there was justification for many opinions popularly held as to the harmful effects of certain elements and not hold their views on the strength of tradition. It had long been the custom to regard 0.06 as the limit of phosphorus or sulphur for commercial steels containing up to 0.15 of carbon. British standard specifications limited the proportion to 0.07 to 0.08. The prejudice had the worst possible effect, because when steel, exceeding that amount, failed to pass the test, managers made a scapegoat of the offending element and did not look for the bad work which often was the cause of the breakdown. He knew many cases of faulty work which escaped notice that way. He had repeatedly experimented with excessive phosphorus, with quite satisfactory results. He treated cuttings of 4-inch billets—one containing 0.04 and the other 0.06. The one containing the higher phosphorus was harder, but the ductility in both cases was excellent all through, and he had succeeded in bending the test pieces double without fracture. In that respect the higher phosphorus made no difference. The speaker showed a piece of plate containing 0.12 of phosphorus which he said was perfectly tough. He had etched it and pickled it severely yet they could still see the ropy and fibrous center. He had another piece containing 0.19 which sheared perfectly soft. Large thick sheets were more liable to develop crystalline brittleness, but he had a piece of sheet containing 0.26 of phosphorus which showed 22 per cent of elongation. Phosphorus, like strychnine, had its uses, and only required to be used with discrimination.

A Very Important Paper

Prof. J. O. Arnold described the paper as a book full of the most important matter ever brought before the institute. He advocated keeping a sensible balance in those matters of elements. Many armament manufacturers were simply writhing under unreasonable specifications for sulphur and phosphorus, especially emanating from the admiralty. Mr. Ridsdale had been juggling with 0.12 of phosphorus, which turned his (Prof. Arnold's) blood cold. He knew cases where the specification was 0.038 of phosphorus and because steel was 0.042 it was rejected. That was not only unfair—it was restricting output in the country to insist on such a ridiculous specification. He believed when well below 0.1 per cent of phosphorus, there was no danger to structural steels. He quite agreed also as to the influences of copper. The trouble was that when an error got into a text book it took about 20 years to get it out. For a quarter of a century it had been said that copper was steel poison causing cold-shortness and red-shortness. All that was absolute piffle. In the early eighties when hematite was nearly as dear as at present, the firm of Brown, Bayley & Dixon, with whom he was then engaged, had an offer of 700 tons of pig iron from Middlesbrough at a very low figure; the iron was said to be useless because it contained ½ per cent of copper. Dr. Cooper who was then chief did not believe all he read in the books, and he had that pig iron made into bessemer steel rails which averaged 0.47 per cent of copper. The inspector passed them and those rails were in use 17 years, and he found from inquiry that there was not a single failure among them. A Sheffield metallurgist who went to one of the big American companies, wrote to him to say that his first business was to ascertain the cause of the superiority of that company's rails over those of everbody else in America. He wrote to say that the secret was out. Those rails from the particular ores they were using panned out about 0.5 per cent of copper. He (Prof. Arnold) was satisfied that copper to a small extent was not an impurity, it was absolutely an improvement.

F. W. Harbord suggested that the term "tempering" should mean "modifying or regulating hardness". He disagreed with Dr. Stead as to sulphur and phosphorus, and it would be a serious matter if the student went away with the impression that it was not dangerous to have phosphorus up to 0.15.

C. J. Bagley said he did not agree with Dr. Stead's remarks on sulphur and phosphorus. Civil engineers who generally drew up specifications had a margin ten times over the greatest strain that might be put in actual use upon any material, and that was a fair margin of safety. His firm had taken millions of tests of plates with low phosphorus during the past 20 years, and not one-half per cent had been rejected. If they could get equally good results with high phosphorus and sulphur, then they might say no great harm would result from increasing the amount, but until that was done the new doctrine was not safe. They would run the risk of rejections if they exceeded the engineering margin of 0.05.

Dr. Stead's Reply

Extraordinary interest was imparted to the second day's proceedings of the institute through a remarkably able reply by Dr. Stead to the discussion on the previous day, relative to his paper.

Especially interesting to America must be the extremely kind references to their countryman, Prof. H. M. Howe, whose paper was lengthily extracted from by the secretary, G. C. Lloyd. Loud applause greeted Sir Robert Hadfield's frank acknowledgement of the practical sympathy with England shown by Prof. Howe in the present struggle. Sir Robert was good enough afterwards to allow the representative a sight of a recent letter from Prof. Howe, referred to by the recipient in the course of the discussion.

Doctor Stead replying to the discussion, remarked that he never mentioned the words "shell" in his paper, yet certain gentlemen appeared to be answering a previous paper which he once wrote upon shell steel, and their statements upon the present paper could only be described as terminological inexactitudes. He never advocated high sulphur or high phosphorus. He had prefaced his remarks by pointing out that he had urged on every occasion that every means should be employed to reduce these elements to the lowest limits. What he said was, and nobody denied it, that for certain purposes phosphorus and sulphur might be useful, and that certain steels were actually sold in the country on account of certain properties which could only be conferred by sulphur. Nobody had denied that. Sir Robert Hadfield had hinted how fearful the consequences would be for a gunner if a shell burst in the gun itself. With that he perfectly agreed, but Sir Robert had not brought one atom of evidence to prove that if a shell contained 0.07 per cent of sulphur or phosphorus, that shell would be in the slightest degree liable to break up on that account. It was well known that at the beginning of the war sulphur and phosphorus were restricted to 0.04

per cent in all shells. It was alleged that the shell would be liable to break up if that were raised to 0.06. But he must congratulate the country and he must congratulate Sir Robert Hadfield also because it was mainly Sir Robert's influence which, against the wishes of other shell makers, was responsible for the raising of the limit for land shells to 0.06. He ventured to say that the increase of 50 per cent in those elements had not made the slightest difference to the shells, which did not now break up in the gun more than they previously did. What he understood was that owing to the greater care in other directions, not at all connected with composition, the steel did not oftener break up now than it did before, when sulphur and phosphorus were kept down to 0.04 per cent. Sir Robert's advocacy convinced even the people who opposed him even at the beginning, and they were allowing a practical use of 0.06 which did no harm whatever. Sir Robert had referred to armored steel. He (Dr. Stead) was very careful in his shell paper to point out that steel for armor piercing purposes ought to be made as pure as possible. A material which had to be heated and quenched to get those peculiar and excellent qualities required for armor must have the greatest possible purity. He absolutely agreed with Sir Robert on that point, and nobody advocated extending the limits, but what was past their comprehension was that after allowing the results of their experience with land steels to be published, the admiralty should not allow the same non-hardened steel to be used for naval shells. American specifications admitted 0.06 per cent of sulphur and phosphorus, which meant that they were taking advantage of the knowledge obtained in Old England. History was repeating itself. Englishmen made advances in knowledge; other people used them, and then England came in afterwards. He hoped Sir Robert would continue the good work he had commenced by advocating trials being made with shell steel containing up to 0.07 and 0.08 per cent of sulphur and phosphorus. Of course nobody would pretend to make a shell with steel containing 0.12 per cent. A great many trials must be made before any such extension could be considered, but there was much opening for experiment with shells slightly exceeding the prescribed limits, but which had all the necessary physical properties. He (Dr. Stead) had tried in vain to get this done, but he was only a mere miserable outsider not connected with the powers that be. Then he was also regarded as an interfering crank, for suggesting to the high authorities that they had any specifications which were not entirely perfect. The want of any true sort of research had cost the country many thousands in the past, and, unless they improved, would cost many thousands in the future.

Notes Upon Pearlite

The secretary read lengthy extracts from the paper by Prof. H. M. Howe, of New York, entitled "Notes Upon Pearlite".

Doctor Arnold, in opening the discussion, said he had read the paper with great interest and it embodied a great amount of very careful work. They were very glad to have a paper from Prof. Howe, because he had been one of their truest Atlantic cousins, not "too proud to fight" on behalf of the cause of Great Britain in which he believed, and he, (Dr. Arnold) was glad that the vice presidency of the institute had been conferred upon him because of his advocacy of the British cause in the American papers. One point on which he felt bound to disagree with the professor was in regard to those very high refinements of nomenclature, and he very much questioned whether it was to the benefit of the ordinary steelmaker to go into those refinements, which had no real mechanical meaning. He would like Dr. Howe to further consider the matter.

Professor Turner said the paper was a distinct addition to their scientific knowledge of the subject.

Sir Robert Hadfield said that the extremely useful tensile tables would be still more useful if Dr. Howe would give the hardness tests, the mechanical tests, the Brinell hardness number, and the scleroscope hardness number. He would be very happy to carry out for Dr. Howe the shop tests, if that was agreeable to him. The work of that paper had been absolutely accomplished by means of the pyrometer, and that showed the enormous advance that had been made. In a letter to himself, Dr. Howe had remarked, that in 1890 he took the first pyrometer to America, and that was its introduction in the western world. At the present time, Dr. Howe mentioned the pyrometers had become common, and there must now be at least a dozen concerns, some of them of great importance, which were supplying American manufacturers with pyrometers. He was glad to hear the tribute already offered to Prof. Howe's great work. They had many good friends among neutrals, and especially in America, but there was no more loyal friend to Old England than Prof. Howe.

Sixty Millions

Represent Size of Orders for Munitions to be Placed

Toronto, Oct. 17.—The imperial munitions board at Ottawa has been instructed to place additional contracts for war munitions to the value of $60,000,000. Since the beginning of the year, orders have been placed to the amount of $185,000,000. The industry was interrupted during July and August owing to the shortage of steel and forgings, but the board states that owing to the efforts put forth by manufacturers the output is now more satisfactory and increasing in volume each week. The quantity of shrapnel shells produced complete each week has reached nearly 250,000 and the board has been authorized to place continuation orders for this size of shell into 1917. The contracts awarded last spring and summer for the larger sizes of shells involved the new installation of machinery and equipment, deliveries of which were slow. Many of these plants have now commenced operating and the output of the larger-sized shells is increasing weekly and should reach its maximum about Jan. 1. The position as regards the supply of steel is now such that no interruptions in the output are likely to occur, as the immense tonnage required for all classes of shells has been arranged for well ahead. The fuse plant built by the board at Montreal has reached a capacity of 10,000 per day, and by Jan. 1 will have a capacity of 25,000 per day. The board states that its policy in placing new business will be to keep all plants now producing munitions fully employed, and where increased production is required to extend the operations of plants already equipped and engaged in producing munitions.

The Erie Foundry Co., Erie, Pa., manufacturer of steam drop hammers, galvanizing equipment and the like, is building an addition, 40 x 200 feet, to its machine shop. The company has purchased some new equipment, including planers, boring mills and drill presses, which will be put into operation about Dec. 1.

The Mathews Gravity Carrier Co., Ellwood City, Pa., is increasing its capacity. The company is erecting a building for assembling and shipping material and a new storage house, 80 x 80 feet, and a forge shop, 40 x 60 feet, are under course of construction. Considerable equipment has been purchased.

News of Employers and Employes

Human Engineering Conference at Columbus—Closer Relations of Employers and Salaried Employes in a Cleveland Organization

A CONFERENCE on human engineering for the purpose of promoting a better understanding between engineers and men who work for them will be held at Ohio State University, Columbus, Oct. 26, 27 and 28, under auspices of the college of engineering of the university. Discussions will be participated in by manufacturers, economists, engineers, labor leaders, business men and social welfare workers. Among those who will speak are J. A. Jeffrey, president of the Jeffrey Mfg. Co., Columbus; William A. Grieves, superintendent of employment and head of welfare work for the Jeffrey Mfg. Co., John P. Frey, editor of The *International Molders' Journal*, and William Beahan, Cleveland, civil engineer of the New York Central railroad.

Getting Together

The embryo of what promises to be a nation-wide movement to foster a closer relationship between the employer and the salaried employe is to be found in the principles of the Industrial Association of Cleveland. This new organization draws its membership from a field hitherto untouched by the various labor unions and manufacturers' clubs and promises to become a very pertinent factor in industrial activities.

The purpose of the association is two-fold, first to effect a more intimate relation between the employer and the salaried employe and second to instigate a movement for a more intelligent relation between industry and the government. In doing the first, the association will provide a point of contact for the employe and employer and also will furnish the opportunity for employes doing the same character of work to meet and to discuss the problems in which they are mutually interested. An educational program has been started which, it is hoped, will aid shop foremen and superintendents to enter into the human equation more harmoniously. A political committee has been appointed which will provide a program of discussions on the many important acts of legislation which affect both the employer and the employe.

The new association has met with hearty approval from many industrial leaders. J. H. Foster, vice president and general manager of the Hydraulic Pressed Steel Co., Cleveland, says, in a letter accepting the presidency of the association: "For several years, it has become more and more apparent that the fundamental interest of the employer and the employe is mutual and identical, viz; the success of their house, its ability to return proper wages and income—and with the dawn of this understanding of the fundamental relationship, we have seen the desire for a complete understanding—a recognition by the employer of all the things due to the employed—just wages—opportunity for education and advancement—betterment of hours and condition—a recognition by the employed of a fair return to the employer, of intelligent, efficient performance."

The employers and employes are equally represented on the board of managers of the association. For the present, monthly meetings will be held, but as the association grows, separate divisions will be formed which will include the men doing the same type of work, such as foremen, clerks, etc. The officers are J. H. Foster, president; L. H. Kittredge, president, the Peerless Motor Car Co., Cleveland, vice president; H. H. Camp, Camp Conduit Co., Cleveland, treasurer; Edward Hobday, secretary.

Big Barbecue

The New Departure Mfg. Co., Bristol, Conn., recently made a new record for barbecues, at least for the eastern part of the country, when 2,700 of its employes sat down to an old fashioned barbecued dinner of grilled lamb with all the fixings. The company furnished everything necessary for the big feed, including 80 spring lambs, 9,000 ears of corn and 30 bushels of potatoes. The program was carried out under the supervision of the New Departure Mutual Relief Association.

Group Insurance

Business and philanthropy are not as far removed from each other as was true in past years, or as is generally supposed to be true today. When, a few days ago, Charles Whiting Williams, executive secretary of the Cleveland Federation for Charity and Philanthropy, resigned to go into the insurance business, the change was not as radical as it seemed, for Mr. Williams is going from an organization famous for its businesslike handling of funds contributed for charitable purposes and he is to become connected with the extension of group insurance, which has been developing rapidly as a sound means of cultivating more friendly relations of employers and employes. It has been found that dealing with groups rather than individuals presents distinct advantages in handling problems of working and living conditions and tends to discourage strikes. Mr. Williams will be with the Equitable Life Assurance Society after Jan. 1.

Will Employ Soldiers

Milwaukee, Wis., Oct. 16.—The Allis-Chalmers Mfg. Co., International Harvester Co., Harley-Davidson Motor Co., and other large machinery concerns of Milwaukee have made public announcement that they will re-engage immediately upon their return all of the men who left their employ to join the First Wisconsin Brigade in answer to the President's call for troops in June. The Wisconsin troops are expected back momentarily and the problem of employment has been of considerable concern to the men. The Merchants' and Manufacturers' Association is making arrangements to obtain positions for men without regular employment and has appointed Gen. Otto H. Falk, president of Allis-Chalmers, as chairman of the committee.

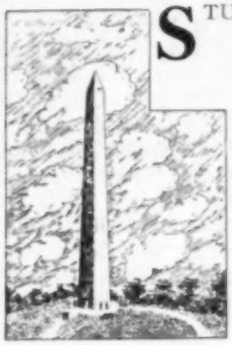
Sharp Criticism

The National Elevator Manufacturers' association at its sixth semi-annual convention in the Copley-Plaza, Boston, last week, elected these officers: C. H. M. Atkins, Cincinnati, president; J. H. DeVere, Columbus, O., vice president; George T. Marshall, Pittsburgh, treasurer; I. N. Haughton, Toledo, O., secretary; Martin B. McLaughlin, Boston, member of the executive committee. The convention was attended by 42 members. Sharp criticisms of the methods of labor unions in enforcing their demands and an outspoken denunciation of legislators who help make these methods effective made noteworthy the address of Alonzo B. See of the A. B. See Electric Elevator Co., Boston, at the banquet.

Business News of Nation's Capital

Government Officials Impressed by Papers Presented at Meeting of American Chemical Society—Awards of Guns and Forgings to Two Companies

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Oct. 17, 1916.



STUDY being given by government officials to the matter of manufacturing nitrates indicates that the by-product coke oven is growing in favor as the medium for this process. The papers presented at the recent New York meeting of the American Chemical Society by H. C. Porter, of the H. Koppers Co., Pittsburgh, and C. G. Atwater, manager of the agricultural department of the Barrett Co., New York, have aroused particular interest here in producing nitrogen by means of the by-product coke oven. They have tended to show more clearly than ever the unwisdom of expending $20,000,000 for a plant to recover ammonia from atmospheric nitrogen. As has been pointed out by *The Iron Trade Review*, the legislation appropriating this sum for a nitrate plant is not of a mandatory character, and, unless present signs fail, it will never be erected. The investigation into the subject by the government is, however, in its primary stage, and necessarily it is impossible to say what plan will be determined upon after it is concluded.

The war department is conducting the investigation, and expects to have the report on the plan to produce nitrates ready about the first of the year. Inquiry into processes abroad is to be made for the war department by Dr. Charles L. Parsons, chief chemist of the bureau of mines, department of the interior. The war department has also called upon the National Academy of Sciences for a report which will assist it in reaching a conclusion as to which one of the various known processes for the manufacture of nitric acid is best. It is the plan of the legislation on the subject to make the government of the United States entirely independent on a foreign source for the production of explosives for military requirements. At the same time, the National Academy of Sciences will, in accordance with the legislation, take into consideration the use of the excess capacity over that which would be required for the government's military needs in time of peace, this phase of the matter being based on plans for the proposed plant. It was the idea of those members of congress who so insistently urged the erection of a government nitrate plant that it be turned to the manufacture of fertilizers for farmers when it is not producing nitrates. Putting it plainly, this was taken by opponents of the idea to be "pork" legislation, designed to win the votes of the agricultural interests. Of course, production of fertilizers is to be encouraged but the plan suggested by congress has been bitterly condemned.

It is evident, however, that the idea of erecting such a plant is receiving less consideration as a study of the subject progresses and that in proportion the plan to produce nitrates by means of ammonia from by-product coke ovens is growing in favor. The ample coke oven resources of this country were sharply brought out in the papers of Mr. Porter and Mr. Atwater. On the other hand, one of the obstacles to the production of nitrates through a plant adapted to the process of atmospheric fixation is that it would be difficult to find ample water power in this country for that purpose. It has been stated by some authorities that it would take all of the power of the Niagara Falls to produce nitrates in the quantities required. It has also been pointed out that, from a military point of view, this plan would be dangerous. With only one such plant in existence, it has been asserted, it would be subject to invasion or capture by an enemy force, thus shutting off at least the immediate and possibly the future supply of explosives necessary to conduct a war, and protect the nation. It is declared a sufficient reserve could not be stored in case of prolonged hostilities. Again, the tremendous cost of coal that would be required for such a plant is held to be another important factor against it.

In the course of the investigation in this country, the by-product coke industry will be given a careful study with regard to its potentialities in the way of supplying nitrates. Mr. Porter submitted illuminating figures in his paper showing the increase in capacity for ammonia production at by-product coke plants due to new establishments now building, saying it amounted to 46,400 tons of ammonia in 1916. Data such as he and others gave will be of great aid in assisting the investigators of the government, according to statements of interested government officials here.

Dr. Parsons sailed about two weeks ago to take up the investigation abroad. His study will take him to England, France, Italy, Norway and Sweden. Of these countries, Norway is understood to have the only atmospheric fixation plant. Germany, which has developed fixation processes, will not be visited by Dr. Parsons. The countries other than Norway which Dr. Parsons will visit are said to use both the by-product ammonia from coal and the ammonia produced from cyanamide.

Guns and Forgings

Washington, Oct. 17.—Contracts for 26 14-inch guns and 24 14-inch gun forgings for the four battle cruisers authorized by the naval act have been equally divided between the Bethlehem Steel Co. and the Midvale Steel & Ordnance Co. by the bureau of ordnance, navy department. The Midvale bid was $116,000 for each gun, while the Bethlehem bid was $116,900 for each gun. On the forgings, the Midvale company bid 35c per pound, and the Bethlehem company 35¼c per pound. The award for 10 sets of 5-inch gun forgings for the cruisers was given to the Crucible Steel Co., which bid 34.35c per pound for nickel steel and 28.75c per pound for gun steel.

Bids were opened last Friday by the bureau of ordnance, war department, for 18 12-inch barbette carriages and 21 3-inch anti-aircraft mounts, both of the model of 1917. The Bethlehem Steel Co., bidding on all 18 sets of carriages, put in a figure of $79,022.38 each, and for nine sets its figure was $82,686.83 each. The Midvale Steel & Ordnance Co. was low, bidding $69,875 each on nine sets. The former company offers to make delivery of 18 carriages in 28 months and nine in 23 months, while the Midvale proposes to make delivery of the first carriage in 16 months, and one every

60 days thereafter. The bid put in on nine 12-inch carriages by the American & British Mfg. Co. has caused confusion. The price given is $232,620 for each carriage, but it is believed an error was made when this figure was submitted, because it would seem to be entirely too high for each sum and entirely too low for all nine of them.

The Bethlehem company was the lowest bidder on the 21 mounts, at a figure of $6,700 each for the entire contract or $7,450 each for any number less than 21 sets. It would deliver one mount in 10 months and five per month thereafter. The Midvale company bid $9,455 each on the 21 mounts, offering to deliver the first mount in 14 months and four mounts per month thereafter. On 10 mounts, the American & British company bid $13,362.66 each, on 11 $13,035.21 each, and on 21 $10,801.24 each, the first amount to be delivered in six months and two mounts per month thereafter.

Mine Accidents

Washington, Oct. 17.—While there was a slight decrease in the number of men killed in the metal mines of the United States in 1915 as compared with 1914, according to reports made to the bureau of mines by operators, the fatality rate for the former year was slightly higher than it was in 1914. The number killed in 1915 was 553 in 1915 as compared with 559 in 1914, 683 in 1913, and 661 in 1911. The number of men employed, however, during 1915, was slightly less than the previous year, the numbers being 152,118 in 1915 as compared with 158,115 in 1914. The fatality rate, therefore, for 1915, was slightly higher than for the preceding year, being 3.64 per 1,000 men employed in 1915 as against 3.54 per 1,000 for 1914; 3.57 in 1913; 3.91 in 1912, and 4.19 for 1911.

Growing Rapidly

Ann Arbor, Mich., Oct. 16.—At the annual meeting of the Hoover Steel Ball Co., the capital stock of the concern was advanced from $500,000 to $1,800,000. The concern came to Ann Arbor in 1913, being the old defunct Flanders ball bearing department. The first year there were 32 employes and annual sales of $163,000; the next year there were several hundred employes and the sales record went to $1,310,000; it is promised that the sales for the present year will be $3,000,000. The company has orders on its books for 40,000,000 one-quarter inch basis balls which are as yet, unfilled.

Proposed Contract

With Provision for Damages Approved by Manufacturers.

Additional information relative to the proposed contract form first advocated by the American Iron and Steel Institute, is offered in a 24-page pamphlet being distributed by the National Association of Sheet and Tin Plate Manufacturers, organized several months ago by 24 independent concerns. Aside from explaining the proposed contract, the brochure contains the names of members and officers of the association, a copy of a resolution endorsing the proposed contract form adopted at the July meeting a number of letters of manufacturers and consumers containing expressions about the new contract and a synopsis outlining the purposes of the organization.

The new contract, it is pointed out in the pamphlet, contemplates an irrevocable sale and purchase, not subject to cancellation, postponement of delivery or price revision because of market conditions.

Freights are to be paid in cash, and are not subject to discount; other provisions and conditions are similar to the regular form of contract now in use, except that the contract contains the following liquidating damage clauses:

"The buyer's failure to furnish specifications as herein provided shall be deemed a refusal to accept the tonnage unspecified, which thereupon shall be deducted from the contract; and the buyer shall pay the seller, as liquidated damages and not as a penalty, the difference between the contract price of such material for which the buyer has failed to furnish specification (less freight allowance, if any) and the market price thereof at the time of such failure; but such damages shall not be less than 10 per cent of said contract price.

"If the buyer shall have furnished complete specifications as above provided and shipments are not made by the seller as herein agreed, the tonnage which the seller has failed to ship shall be deducted from the contract, and the seller shall pay to the buyer, as liquidated damages and not as a penalty, the difference between the contract price of such material which the seller has failed to ship (less freight allowance, if any) and the market price thereof at the time of such failure; but such damages shall not be less than 10 per cent (10 per cent) of said contract price."

At the July meeting of the association a resolution recommending the adoption and enforcement of the proposed contract form was adopted by the association. Furthermore, the resolution recommended that "binding contracts only be negotiated and concluded, in which there shall be no provisions or conditions guaranteeing prices against market decline". More than 17,000 copies of the resolution have been distributed among sheet buyers in the United States and Canada.

Members of the association are: Alan Wood Iron & Steel Co., Allegheny Steel Co., American Rolling Mill Co., Apollo Steel Co., Berger Mfg. Co., Brier Hill Steel Co., Canton Sheet Steel Co., Carnahan Tin Plate & Sheet Co., Deforest Sheet & Tin Plate Co., Inland Steel Co., La Belle Iron Works, Mansfield Sheet & Tin Plate Co., Massillon Rolling Mill Co., Newport Rolling Mill Co., Parkersburg Iron & Steel Co., Reeves Mfg. Co., Seneca Iron & Steel Co., Stark Rolling Mill Co., Trumbull Steel Co., Western Reserve Steel Co., Wheeling Corrugating Co., Whitaker-Glessner Co., Youngstown Iron & Steel Co., Youngstown Sheet & Tube Co.

The officers of the association are: President, W. S. Horner; vice president, Joseph B. Andrews; secretary and treasurer, Walter W. Lower.

Executive Committee—W. S. Horner, vice president, American Rolling Mill Co., Pittsburgh; W. A. Thomas, president, Brier Hill Steel Co., Youngstown, O.; John O. Pew, president, Youngstown Iron & Steel Co., Youngstown, O.; Ed. Langenbach, president, Stark Rolling Mill Co., Canton, O.; G. H. Jones, vice president, Inland Steel Co., Chicago; W. H. Abbott, vice president, Wheeling Corrugating Co., Wheeling, W. Va.; Joseph B. Andrews, vice president, Newport Rolling Mill Co., Newport, Ky.

General Counsel—Kinnear, McCloskey & Best, Pittsburgh.

Will Enlarge Plant

The Standard Ship Building Corporation, 44 Whitehall street, New York, has drafted plans for an extensive enlargement of its ship building plant at Shooter's island, adjacent to Staten Island, N. Y. Action on these will be taken before the end of October and the work of improvement then will be pushed as rapidly as possible. The company has applied to the state of New Jersey for the privilege of utilizing submerged flats in the neighborhood of Shooter's island. Contracts now on the books of the Standard company involve seven 7,300-ton vessels.

Making Large Extensions

Stark Rolling Mill Co. Adding Important Improvements —Four Large Buildings Being Erected

In order to improve its service facilities, the Stark Rolling Mill Co., Canton, O., is completing an extensive program of plant extensions and additions. Four large buildings are being erected, and when they are completed the warehouse facilities of the Stark Rolling Mill Co., together with its equipment for handling orders rapidly, will be greatly improved. A 70 x 300-foot extension to the black sheet warehouse will be completed shortly. This will double the black sheet warehouse capacity of the company. The new building will be equipped with two 7½-ton, high speed, 3-motor, Pawling & Harnischfeger traveling cranes. The crane runway, which will extend through the present black sheet warehouse, will have a total length of 600 feet. The old and new warehouse together will afford a storage area of 42,000 square feet. The new extension will be equipped with levelers, reshearing apparatus, etc., for handling black sheets.

The Stark Rolling Mill Co. also is building a 75 x 300-foot extension to its galvanizing department. This will provide space for additional galvanizing pots which will be installed in the future. For the present, the new structure will be used for the storage of black sheets, spelter, etc.

Galvanized Sheet Warehouse

A new building, 120 x 300 feet, is being erected for the storage of galvanized sheets. This building will be provided with a wood block floor furnished by the Jennison-Wright Co., Toledo, O. Electric tractors will be employed for handling the stock in this building. The tractors will haul trains of three or four factory trucks, on which the sheets will be loaded. This equipment has not yet been ordered. The new galvanized sheet warehouse also will be equipped with dial scales.

The present galvanized sheet warehouse will be vacated and turned over to the manufacturing department. It will be equipped with corrugating rolls, shears, etc., for performing finishing operations on sheet steel. A 80 x 100-foot building also is being erected for the storage of fabricated steel products.

Mill type construction has been adopted throughout, using pine timber. The buildings are provided with brick curtain walls and roofing sheets manufactured by the Toncan metal department of the Stark Rolling Mill Co. It is believed that these structures will last as long as steel frame buildings, particularly because some of the framing will be subjected to fumes from the galvanizing pots. The crane runways in the black sheet warehouse will be supported on steel columns. It is stated that a frame mill type building costs as much today as a steel frame building would have cost two years ago.

Iron Sulphate Plant

The Stark Rolling Mill Co. also has recently completed a by-product plant for the recovery of the sulphate of iron in the waste liquor from the galvanizing pots. When entirely completed, it is expected that this plant will have a capacity of about 50 tons of iron sulphate per week. The liquor from the pickling vats is drained into a sump, from which it is pumped into a boiling vat located on the mezzanine floor in the by-product building. The boiling vat is heated by steam circulating through copper coils. The concentrated liquor from the boiling tank is drawn into wooden vats in which the sulphate of iron crystallizes out of the solution.

Contracts Awarded

The Cromwell Steel Co., Cleveland, which will build a steel plant at Lorain, O., has awarded contracts for structural steel to the Eastern Steel Co., for the blooming mill buildings and other auxiliary structures to the Alliance Structural Co., Alliance, O., and for the cranes, to the Alliance Machine Co.

Fields for the Electric Furnace

The first of a series of monthly meetings, which will continue during the winter, was held by the Cleveland section of the American Institute of Electrical Engineers, Monday evening, Oct. 16. The subject for discussion was "The Present-Day Aspect of the Electric Furnace", by W. MacA. Johnson, metallurgical engineer, New York. The paper, which was read in the absence of the author, pointed out some of the fields to which the electric furnace might be applied. According to the author, one of the most promising fields for this furnace is in the melting of non-ferrous metals. The use of electric furnaces for this purpose in foundries will not only result in saving of fuel cost because the heat is applied exactly where it is needed, but also will result in greater efficiency on the part of the men because they will not be subjected to the uncomfortable temperature which occur in the environment of the regular crucible. The rest of the paper was devoted to a discussion of the future of the furnace. A number of the 100 members who attended the meeting entered into the discussion which followed the presentation of the paper.

Contracts for Trumbull Steel Co. Plant

The Trumbull Steel Co., Warren, O., has distributed contracts for some of the equipment to be installed in its new steel works, which will provide steel for its sheet and tin plate mills and for the manufacture of special alloy steel products. The Riter-Conley Mfg. Co., Pittsburgh, will erect an open hearth building, 150 x 450 feet, and a blooming mill building, 70 x 800 feet. Alex Laughlin & Co., Pittsburgh, will build four 100-ton open hearth steel furnaces. The United Engineering & Foundry Co. has been awarded contracts for a 36-inch blooming mill and a hot and a cold strip mill. Contracts for four soaking pits, and Hughes gas producers built by the Wellman, Seaver, Morgan Co., Cleveland, also have been awarded. The Alliance Machine Co., Alliance, O., will furnish the following cranes: One 175-ton 4-girder double trolley ladle crane, 54-foot span; two 5-ton low type rope soaking pit cranes, 76-foot span; one 150-ton low type rope stripping crane, 76-foot span; one 10-ton standard crane, 68-foot span; two 10-ton magnate cranes, 90-foot span; one 30-ton standard 4-motor crane, 80-foot span; one 10-ton standard crane, 76-foot span.

Large Plate Mill.—The United Engineering & Foundry Co., Pittsburgh, is building a 204-inch plate mill, said to be the largest plate mill in the world, for the Lukens Iron & Steel Co., Coatesville, Pa. The steel castings are being made at the Vandergrift plant and the iron castings at the Youngstown plant of the United company. Two of the rolls will weigh about 90 tons each in the rough.

Iron and Money: Fact and Comment

Car Shortage, Hot Weather and Labor Conditions Scaled Steel Company Earnings Down in Third Quarter—Lackawanna Steel Issues Report for That Period

THE car shortage, hot weather and labor conditions combined in the third quarter to reduce profits of iron and steel producers, despite the higher prices at which deliveries were made. It is believed in the steel trade circles that the earnings of the Steel Corporation for the three months ended Sept. 30, to be made public late this month, will be shown to have been considerably under the estimates of $95,000,000 which have been heard so frequently.

The Lackawanna Steel Co., one of the few important independent steel producers to publish quarterly earnings statements, has issued its report for the third quarter. Net profits for this period amounted to $3,060,700, while earnings for the second quarter were slightly larger, amounting to $3,067,273. Net profits for nine months, after all deductions were $8,379,042, as compared with $613,349 the same period last year. The increased strength of Lackawanna's financial condition is indicated by the decrease in the amount of bond and note interest it was compelled to pay in the third quarter, this item showing a reduction of $60,875, while for the nine months the reduction amounted to $117,825. The comparative income accounts for the third quarters of 1916 and 1915 follow:

	Third quarter, 1916.	1915.
Inc. from mfg. after oper. expenses	$4,045,193	$1,882,191
Bond and note int. and royalties	442,396	505,334
Balance	$3,602,796	$1,376,857
Less:—Approp. for extinguish. of mines	108,198	100,322
Deprec. and renew.	433,897	365,810
Total deductions	$542,096	$466,133
Profit for 3d quar.	$3,060,700	$910,724

The comparative income accounts of the first nine months of this year and last follow:

Inc. from mfg. after oper. expenses	$11,343,820	$3,234,079
Bond and note int. and royalties	1,417,039	1,539,385
Balance	$9,926,780	$1,694,694
Less:—approp. for extinguish. of mines	262,588	207,482
Deprec. and renew.	1,285,149	873,862
Total deductions	$1,547,737	$1,081,344
Profit for nine months.	$8,379,042	$613,349

The earnings in recent quarters compare as follows:

1916:—	
Third quarter	$3,060,700
Second quarter	3,067,273
First quarter	2,251,068
1915:—	
Fourth quarter	1,795,758
Third quarter	910,724
Second quarter	268,384
First quarter	565,759
1914:—	
Fourth quarter	410,555
Third quarter	457,210
Second quarter	338,473
First quarter	445,206

*Deficit.

A decrease of 187,163 gross tons in unfilled tonnage during the third quarter is shown by the report, bringing the total of unfilled orders on books to the lowest level in a year. The unfilled tonnage at the end of each quarter for a period of several years follows:

Sept. 30, 1916	745,694
June 30, 1916	932,857
Mar. 31, 1916	871,876
Dec. 31, 1915	812,680
Sept. 30, 1915	393,084
June 30, 1915	283,979
Mar. 31, 1915	229,910
Dec. 31, 1914	160,160
Sept. 30, 1914	166,344

Recovery Follows Break in Stocks

"Election chills," submarine activity, and Charles H. Sabin's talk about early peace brought about such a break in the stock market as seldom occurs except in time of panic. But the market already has recovered much of the loss incurred early last week. Speculators are beginning to feel that nothing has happened which materially has changed the foundations upon which the bull market had been built and undoubtedly the let-down which followed the sensational pace of the past two months is really beneficial to general business. Quotations on a number of iron and steel and industrial stocks at the close of the New York stock exchange Oct. 14 and net changes for the preceding week are shown in the following table:

	Close Oct. 14.	Net chg.
American Can	59½	—4¼
American Can, prfd.	113	—1⅛
Amer. Car & Fdy.	64	—5⅜
Amer. Car & Fdy., prfd.	117	—2
American Locomotive	75	—5⅛
American Locomotive, prfd.	103⅜	—2⅜
American Steel Foundries	58	—3
Baldwin Locomotive	79⅜	—9⅛
Bethlehem Steel	532	—16½
Colorado Fuel & Iron	50¼	—7½
Continental Can	104½	+1½
Crucible Steel	79⅞	—12
Crucible Steel, prfd.	118¼	—3¾
General Electric	176	—4½
Gulf States Steel	92	—3½
Gulf States Steel, 1st prfd.	99	—2
Gulf States Steel, 2d prfd.	95	—3
Internat'l Harv. of N. J.	116	.....
International Harv. Corp.	78	—1
Lackawanna Steel	83¾	—2¾
Nat'l Enamel'g & Stmp. Co.	27	—1½
Nat'l En. & Stmp. Co., prf.	95	—1
Pressed Steel Car	65	—1¾
Pressed Steel Car, prfd.	104	— ½
Pullman Palace Car	170	—3
Republic Iron & Steel	69	—8⅛
Republic Iron & Steel, prfd.	112	— ¼
U. S. C. I. Pipe & Fdy. Co.	22¾	—1⅛
U. S. C. I. P. & Fdy., prfd.	57	+ ⅜
United States Steel	108⅛	—8
United States Steel, prfd.	120	— ⅝
Westinghouse Mfg. Co.	60½	—4¼

Maximum quotations for a number of leading iron and steel securities not listed on the New York stock exchange as of Oct. 6 and Oct. 13 compare as follows:

	Oct. 13.	Oct. 6.
American Radiator	400½	405
American Ship Building	60	55
Cambria Steel	100	91
Chicago Pneumatic Tool	74½	75
LaBelle Iron Works	77	80½
Lake Superior Corp'n	14⅜	15¾
Stewart-Warner Speed. Co.	116¾	117
Warwick Iron & Steel	9¾	9⅞
Westinghouse Air Brake	158½	160
Westingh'se Elec. & Mfg. Co.	65	67¼

Colorado Fuel Profits Improve

About the best that can be said about the annual report of the Colorado Fuel & Iron Co. for the year ended June 30, 1916, is that it is much less dismal than the showings of previous years. Gross earnings attained the greatest volume the company has ever experienced and net earnings were among the largest ever reported. With iron and steel market conditions as they have been since the middle of 1915, and with industrial conditions generally most favorable for producers of raw materials, any other result than this would have been surprising. But in the face of this comparative improvement, the earnings for the unwieldy mass of common stock figure out a very small percentage. Unless the company, by new construction and increased efficiency of operation, made possible through expenditure of present earnings, is liable to increase its earning power, no immediate promise appears to be held out to the common shareholders.

Gross earnings for the year were $25,626,605, or $9,048,565 more than the previous year, a gain of 54.7 per cent. Total net earnings were $4,246,085, an

increase of $2,581,027, or 11.98 per cent. The surplus available for preferred and common dividends was $2,201,170, as compared with a deficit of $334,661, the previous year. Allowing for the regular dividends of 8 per cent on the preferred stock, amounting to $160,000 per annum, the surplus for common would be $2,041,170, or about 5.6 per cent. But the company started the year with dividends of about 52 per cent in arrears on the preferred stock. It paid off 30 per cent of these during the year and still has 30 per cent accumulated. After this disbursement, a surplus of $1,601,170 was carried to the profit and loss account. The income account follows:

INCOME ACCOUNT.

Gross earn. fr. oper..	$25,626,605	
Oper. and management	21,280,519	
Net earn. from oper...	$4,346,085	
Add.: Inc. from secur.	492,006	
Int. and exchange.....	132,984	
		$4,971,076
Deduct: Bond int.....	$2,011,958	
Taxes	348,888	
		2,360,847
Surp. over fixed chgs., as above		$2,610,229
Less: Prov. for sink. funds, etc.	184,088	
Insur. and pers. injury	58,000	
Crystal River R. R. Co. traf. contr. guaranty.	15,000	
Prospecting	6,969	
Equip. renewal	145,000	
		409,058
Surp. after deductions..		$2,201,170
Less: 30 per cent on prfd. stock		600,000
Surp. to profit and loss		$1,601,170

American Ship Outlook Bright

Modest profits for 1916 but glowing prospects for 1917 are indicated in the report of the American Ship Building Co. for the year ended June 30. This report was submitted to stockholders at the annual meeting in Jersey City, Oct. 10. Net profits for the fiscal year were $579,307. If the full 7 per cent had been paid on the $7,900,000 outstanding preferred stock, there would have only been a fraction of 1 per cent available for common dividends. But this statement does not begin to reflect the prosperity of the company. Only four boats were completed during the year, with a total carrying capacity of about 37,000 gross tons. At the end of the fiscal year, however, there were 33 boats under contract with a total carrying capacity of about 174,000 gross tons. In addition there are now two large ships for delivery the last half of 1917. Present prospects are favorable for securing enough contracts to fill all building berths for 1917 delivery. Since the fiscal year closed securities carried on the books at $487,445 have been in great part disposed of, the securities sold netting $262,530 in excess of the value at which they were carried. Interlake Steam Ship, sold at 140, made up a considerable amount of these securities. The bulk of the earnings reported for the fiscal year accrued in the last six months of this period, so that, in the words of President M. E. Farr, the exhibit "does not reflect the maximum earning capacity." The income account for the fiscal year ended June 30, 1916, follows:

INCOME ACCOUNT.

Earnings	$1,643,645
Other income	165,124
Total income	1,808,769
General expense	369,395
Taxes	149,166
Replacement	362,805
Depreciation	325,472
Interest	22,624
Total deductions	1,229,462
Net profit	579,306

Current assets total $3,460,468 while current liabilities are $1,203,697. Advances received on construction contracts amount to $2,972,662.

Talk on Credits

At the meeting of the Pittsburgh Foundrymen's Association, Monday evening, Oct. 16, J. M. McComb, credit manager of the Crucible Steel Company of America, Pittsburgh, delivered an address on credits and collections. He said that in these strenuous times it often requires courage, tact and persistence to seek full information from the debtor, because the buyer does not want any delay at all in having his order accepted and any system or effort which enables the seller to avoid delay is essential. He said that in many cases it is a serious mistake to take merely figures as an index to the future prospects of the business, for ability and experience in the business in which the customer is engaged are daily becoming of greater importance in granting credit than a mere statement of assets and liabilities. He laid much stress on personnel, saying that the reputation of those owning, managing or directing a business is very important, as are also the individual experience, standing and character of those who are directors and executive officers. In conclusion, he said:

"More and more, we realize, by experience, that the tendency of the times is shortening of the terms, more regard for the obligation created under these terms, the opportunity to close a large volume of book accounts by trade acceptances, providing liquid capital for a concern of limited means, a firm attitude on the part of the seller against the abuse of trade terms,—all tending to make it possible to have better collections. The price of success in giving credit successfully, and collecting the money that is due you calls for a more and ever increasing amount of effort to obtain all the facts with regard to your customer."

Financial Crop Ends

The Zimmerman Steel Co., Bettendorf, Ia., advises through Manager C. H. Atherton it has not been sold to the A. J. Kirstin Co., Escanaba, Mich., as was reported recently. The fact is that an order for stump pullers amounting to $100,000 was taken from the A. J. Kirstin Co., for delivery over the next year, and this may have led to the misunderstanding.

* * *

The Henry-Miller Foundry Co., Canton, O., has purchased the works formerly occupied by the Novelty Iron Co., in that city, and shortly will begin operating with a large force of men in the manufacture of furnaces, boilers and iron castings. C. J. Miller, Medina, O., T. E. Henry and E. S. Moncrief, Cleveland, who are at the head of the Henry-Miller Foundry Co., will apply for incorporation papers immediately.

* * *

Officers of the Cleveland Axle Co., Canton, O., have been re-elected as follows: President, G. A. Laughlin; vice president and treasurer, S. O. Laughlin; vice president and general manager, J. B. Childe; secretary, W. S. Sherer; assistant secretary, C. A. Shevraux. Officers of the Cleveland-Canton Spring Co. are the same except that the secretary is C. A. Chevraux and assistant secretary W. E. Sherer.

* * *

Stockholders of the Central Iron & Steel Co., Harrisburg, Pa., have elected the following directors to take charge of the company's affairs when the receivership is ended shortly: Edward Bailey, Charles Bailey Jr., James M. Cameron, Donald McCormick and Henry B. McCormick, all of Harrisburg. Officers are: President, Robert H. Irons; vice president, Francis J. Hall; secretary and treasurer, L. D. Perry.

* * *

At a meeting of the finance committee of the Steel Corporation last week an appropriation of $1,200,000 was passed for reconstructing billet and bar mills at the plant of the Carnegie Steel Co., at Farrell, Pa. Newspaper reports previously circulated to the effect that this improvement had been authorized were premature. The present billet and bar mills at the Farrell plant were installed some years ago and the improvement now ordered is to modernize these and to increase their capacity.

Texas Plant

Considered at a Recent Meeting—Captain Wolvin Presides

Austin, Tex., Oct. 16.—At a recent meeting of the Texas Resources Development Corporation board of directors held at Galveston, the proposition of building a blast furnace and open-hearth plant at Texas City, Tex., was gone into. The meeting was presided over by Captain A. B. Wolvin, of Duluth, Minn., president of the company. Among other directors and stockholders present were H. Vanderhoof and W. R. Condict, of Chicago. Reports of engineers who have been employed for some time in working out the details of the proposed industry were heard and it is stated that these findings were entirely favorable to the project. The company has had under consideration for several years the matter of developing its extensive iron ore holdings, situated in Cass county, in the vicinity of Ore City, the washing of the ore and its transportation to tidewater at Texas City. The iron ore beds have been prospected sufficiently to determine that there are now about 30,000,000 tons of iron ore in sight.

While the plans of the company for the establishment of an iron industry at Texas City are as yet somewhat tentative, or at least, they have not reached the stage when making them known to the public is deemed advisable, it is reported that the blast furnace will smelt approximately 250,000 tons of ore per annum. It is stated that the Gulf, Colorado & Santa Fe and its connecting subsidiary, the Port Bolivar & Iron Ore railroad have agreed upon a low freight rate for the movement of the ore to tidewater. An extension of the Port Bolivar & Iron Ore railroad is now being constructed from Ore City to Daingerfield, traversing undeveloped iron ore land. The coke supply for the proposed industry will be brought to Texas City by water.

Captain Wolvin has large interests at Texas City. He and his associates established and practically own the deep-water port. They established the Wolvin line of steamships several years ago. It is stated that they are amply able, financially and otherwise, to carry out whatever plans they may have on foot for the building of a blast furnace and open-hearth plant.

An official memorandum which was considered at the recent meeting was submitted by the engineers who investigated the different phases of the project, and reads as follows:

"The supply of this finished material today consumed in Texas and adjoining territory is now being shipped from the Pittsburgh district at a freight rate of $6 per ton delivered at Texas City, from which point it is distributed through the contiguous territory, so that this plant located at Texas City would have this advantage in the freight rate as against the product shipped from Pittsburgh territory. It may be argued that this same line of goods might be shipped from Birmingham, Ala. In answer to this, will say that an average differential in the freight rate as compared with Texas City as against Birmingham, is $4.50 per ton in favor of the former location. So that from the standpoint of domestic manufacture and distribution, Texas City as a location for this plant has an advantage in the freight rate of from $4.50 to $6 per ton as against Birmingham and Pittsburgh territory, and owing to advantageous natural conditions pig iron can be made at the Texas City plant at $3 per ton, actual cost, less than this same commodity is manufactured in Pittsburgh territory."

Adopt Standards

On April 25, 1916, a meeting of representatives of manufacturers of vehicles and axles was held in Cleveland for the purpose of standardizing axle spindles, axle boxes, wheel hubs and flanges for buggies and wagons. As a result of this meeting, a set of standard specifications has been drawn up and adopted by the leading makers in the vehicle trade. Prominent manufacturers of axles and flanges, such as the National Malleable Castings Co., Cleveland, have adopted these standards and have announced that the new standard sizes are the only ones that will be carried in stock hereafter. It is believed that the adoption of this standard will naturally relieve the shortage of material which now distresses the vehicle trade.

Building Operations

Comparative statistics of building and engineering operations in New England, New York, New Jersey, Pennsylvania, Maryland, Delaware, District of Columbia, Virginia, Ohio, West Virginia, Illinois, Indiana, Iowa, Wisconsin, Michigan, Minnesota, North and South Dakota and portions of Missouri and Eastern Kansas, as compiled by the F. W. Dodge Co., show contracts awarded as follows, from Jan. 1 to Oct. 1, of the years named: 1916, $970,251,397; 1915, $680,615,100; 1914, $579,042,100; 1913, $682,425,500; 1912, $627,477,000; 1911, $607,638,813; 1910, $633,002,305.

Benzol Active

For Both Spot and Future Delivery—Toluol Business Moderate

New York, Oct. 17.—Principal activity in the market for coke oven by-products continues to be furnished by benzol and there is an active demand both for spot and contract delivery. Domestic buyers are putting out practically all of this inquiry and European business, either directly or indirectly, figures in it only slightly. Contracts were placed this week for delivery over the 12 months from date and also for the full calendar year of 1917. The contract price is reported around 60 cents, per gallon, and this has been shaded slightly. Spot business is considerable, with the market quotable from 60 to 65 cents. Pending inquiry for benzol is heavy. Toluol business being closed still is of moderate volume. The inquiry is good and other advance indications point to a heavier volume of business later. Prices still lack exactness. For spot, from $3 to $3.50 is quoted, the latter for small lots. The contract market is about $2.50, but this is not an absolute figure. Phenol is very strong with greater difficulty for buyers to get supplies. Free supplies for spot are scarce. Numerous buyers are offering contracts with producers rather indifferent to these overtures. Spot phenol is at 55 to 60 cents, per pound, and contract at 55 cents. Solvent naphtha remains weak with large offerings.

Because of an inadequate supply to meet current demand, prices for sulphate of ammonia still are on the rise. Spot and for contracts for several months now are from $3.80 to $3.85, per 100 pounds, at tidewater. Sellers are unable to supply in full the additional demands of the fertilizer manufacturers and are pro-rating the amounts asked for.

Market Prices for Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.	
Pure benzol	$0.60 to .65
Toluol	3.00 to 3.50
Solvent naphtha	.30 to .35
Per Pound at Producers Plant.	
Phenol	$0.55 to .60
Per 100 Pounds at Seaboard.	
Sulphate of ammonia	$3.80 to 3.85

Contract.

Per Gallon at Producers Plant.	
Pure benzol	$0.60
Toluol	2.50
Solvent naphtha	.30
Per Pound at Producers Plant.	
Phenol (nominal)	$0.55 to .60
Per 100 Pounds at Seaboard.	
Sulphate of ammonia (nearby)	$3.80 to 3.85

The Mesta Machine Co., Pittsburgh, with works at Mesta, Pa., is erecting an addition to increase its furnace and annealing room capacity. Two 40-ton and one 30-ton acid open hearth furnaces and six annealing ovens are being built. The company plans to dismantle two acid furnaces when the new battery is completed.

Strip Steel

Will Be Manufactured at New Plant at Massillon, O.

Plans for the construction of the new plant of the National Pressed Steel Co., at Massillon, O., are rapidly taking definite shape. This company was recently incorporated in Ohio for $1,000,000. The officers include R. E. Bebb, president, who is also president of the Central Steel Co. and the Massillon Rolling Mill Co.; H. M. Nagle, vice president and general manager; K. R. Jenson, secretary and treasurer, and A. J. Townsend, vice president and works manager. The directors, in addition to the foregoing, include C. E. Stuart, who is secretary of the Central Steel Co.; Frederick Griffith, general superintendent of the Central Steel Co., and W. A. Taggart, a Massillon banker.

The National Pressed Steel Co. will manufacture hot and cold rolled strip steel. The company expects to make a feature of special analysis cold rolled and pressed steel products for fireproof building construction. In addition, pickled, lined and oiled strips will be manufactured in a range of gages and sizes. It is estimated that the plant will have an initial capacity of 50,000 to 60,000 tons per year. It will be equipped with modern electrically driven machinery and will include precision type cold rolling mills built in the United States. Construction work will commence in a few weeks on a site which has been selected near the plants of the Central Steel Co. and Massillon Rolling Mill Co. in Massillon. It is expected that the plant will be ready for operation early in the spring of 1917.

Large Order for Posts

The Ornamental Foundry Co., Anniston, Ala., has booked an order for 18,000 white-way posts to be used by the city of Chicago. The Ornamental plant at present has a capacity of 5,000 tons per annum. The above order represents from 10,000 to 12,000 tons of metal, and according to M. G. Schumacher, president, plans are being made to double the output of the plant—this order being sufficient to insure one year's continuous operation at full capacity.

Will Increase Capacity

The Driver-Harris Wire Co., Harrison, N. J., which last spring completed a 1-story, 75 x 120-foot plant for producing cold rolled strip steel and flat wire, is planning to increase the capacity of this department. It will erect a 3-story, 75 x 80-foot building, adjacent to the present building, and will install one or two additional mills to roll the same products. One of the two upper stories in this proposed building will be used as a machine shop while it has not yet been definitely determined for what the other will be employed.

Program of Engineers' Association

W. O. Oschmann, secretary of the Association of Iron and Steel Electrical Engineers, with headquarters at Pittsburgh, has announced the program for the remainder of the year. On Saturday evening, Oct. 21, the association will hold a joint meeting with the American Institute of Electrical Engineers at the Fort Pitt hotel, Pittsburgh. "The Report of the Central Station Power Committee of the American Iron and Steel Electrical Engineers" and "The Advantages of Modern Types of Direct Current Machines", by David Hall, will be read. Both papers were presented at the recent convention of the electrical engineers at Chicago. David Wright will talk about "Variable Speed A-C Motors for Mill Drive" at the November meeting, Nov. 18. The December meeting will be held Dec. 9, under the direction of the Standardization Committee, of which F. D. Egan, recently elected president of the association, is chairman. A Christmas party will be held Saturday evening, Dec. 16 at the German club, Pittsburgh.

Will Build By-Product Ovens

The Semet-Solvay Co., Syracuse, N. Y.; the Whitaker-Glessner Co., Wheeling, W. Va., and the Columbus Iron & Steel Co., Columbus, O., have organized a holding company, which will build and own 100 Semet-Solvay by-product ovens at Portsmouth, O., where the Whitaker-Glessner Co. will build a blast furnace to furnish iron for its open-hearth steel plant at Portsmouth. The coke plant will make about 1,400 tons of coke per day.

New Open Hearth

The Washington Steel & Ordnance Co., Washington, D. C., last week started excavating for a new open-hearth furnace of 35 tons capacity. When complete, this furnace will make a battery of three open hearths with a total of 60 tons per day, operated by the company. Several minor additions, including a copper band shop, recently have been made.

Sligo Plant

Has Been Taken Over and Will be Placed in Operation

The plant of the Sligo Iron & Steel Co., Connellsville, Pa., which has been idle several years, will be put into operation about Nov. 1. The mill has been taken over by a company headed by Richard Irvin, 308 Union Bank building, Pittsburgh, who has been identified with the iron and steel trade for some time. Associated with him are J. C. McConnell of Connellsville, who will act as superintendent, and William Orr, now connected with the Jones & Laughlin Steel Co., Pittsburgh, who has been made assistant superintendent and master mechanic.

The company owns 15 acres and a number of mill buildings and enjoy shipping facilities over the Baltimore & Ohio and the Pennsylvania railroads.

The company will manufacture commercial iron bars ranging from ¾-inch to 5 inches until three open-hearth furnaces of 50-tons capacity each are completed, after which time, steel products will be rolled. Present equipment consists of 16 puddling furnaces; three scrap furnaces; a 20-inch 3-high muck bar mill; a 9-inch guide mill with an independent 12-inch roughing set; a 16-inch bar mill, 4 stands; a 24-inch plate mill, 66 inches wide; a 94-inch plate shear and auxiliary mill and power house equipment. The company is offering commercial iron bars for shipment within 30 to 60 days.

Plan Committee Appointed

The second annual conference of the committee on engineering co-operation, held in Chicago last April, adopted a resolution providing for a sub-committee composed of four men selected by the chairman, to act with him in preparation of a plan to be submitted for consideration at a third conference called for the purpose. Conforming to the instructions in this resolution, F. H. Newell, chairman of the committee, has named Hunter McDonald, Isham Randolph, M. L. Cooke and C. E. Drayer as members of the sub-committee on plan. A first draft of a plan has been made and is in the hands of the sub-committee, which will probably meet during the next month for further consideration of it.

The West Toledo Machine & Tool Co. will be known in the future as the Acme Tool Co., the directors having decided upon the change of name because the original name was similar to that of another company in operation in Toledo.

Machine Tool Prices Are Boosted

Eastern Builders, Feeling Pressure of Heavy Domestic Buying, Revise Lists—Offer of Shell-Making Equipment for Sale Gives New Angle to Lathe Market—Ohio Concern Gets Huge Order

UNDER the surface of what may be termed a pending machine tool market, a good amount of miscellaneous buying continues in the east. A particularly good demand for universal millers and grinders appears at this time, and it is stated that a large number of these types have been purchased within the past few days. Reflecting the heavy inquiry which also prevails for planers, shapers and radial drills, manufacturers of these machines have again boosted their prices from 10 to 12½ per cent. On the other hand a reduction in the prices of some equipment is thought to be near and it is understood that one large manufacturer of hydraulic machinery is considering immediate action with this end in view. Further weakness is also noted in the market for shell-making equipment. Within the past few days, the Baldwin Locomotive Works, Philadelphia, has offered for sale approximately 350 shell-making lathes, involving practically all sizes up to 32 inches. This action has aroused considerable interest and has particular significance at this time.

Perhaps the biggest order booked recently in the machine tool market is that taken by the Alliance Machine Co., Alliance, O., from the Indiana Steel Co., for equipment for its new plate mills at Gary, Ind. It is estimated that this business involved at least $1,000,000, and it is rumored that possibly $2,000,000 will be spent. As yet no new developments have been noted in the way of extensive buying by the leading ordnance building companies, which are expected to receive large contracts as the result of the government's naval construction program. As stated previously, the inquiries from these companies now pending involve at least $1,500,000.

Crane builders report the market as being comparatively quiet. Inquiries appear numerous enough, but high prices and the difficulty of obtaining nearby shipments continue to retard buying. Among the orders placed recently was that of the Crucible Steel Co. calling for a 15-ton crane for its plant at Harrison, N. J. The General Electric Co. is in the market for 10 cranes, including two of 100 tons capacity. It is understood that two of these cranes are for its plant at Schenectady, N. Y., while the others are for its plant at Lynn, Mass. The Bethlehem Steel Co. also is in the market for about 30 cranes for its Sparrows Point, Md., plant.

Foreign buying is slack, although dealers are noting with a considerable degree of satisfaction a growing business coming from South American countries. These inquiries are mainly for machine shop equipment, and several orders involving from five to 10 tools have been recently placed.

The Bread Loaf Mountain Power Co. is planning to build a $300,000 hydro-electric plant at East Middlebury, Vt. The Wollaston Foundry Co. will erect a foundry at Quincy, Mass. Bids are being received on the $320,000 addition for the National Lamp Works of the General Electric Co., at Providence, R. I. The Laing Machine Auto Repair Co. plans the construction of a $10,000 machine shop at Plainfield, N. J. John Sjostrom & Co., Inc., Philadelphia, cabinet makers, are taking sub-bids on a $30,000 factory addition. The Jamestown Chair Co., Jamestown, N. Y., will erect a large plant addition. The United States government is taking bids for alterations and additions to its arsenal at Watervliet, N. Y., involving about $400,000. The Sun Ship Building Co. will start work shortly on a $10,000 addition to its plant at Chester, Pa.

Cleveland Dealers Meeting Strong Inquiries

SALES of tools singly or in lots of two or three machines continue to feature the Cleveland market. Several good inquiries have reached local dealers within the past week and among them is a request from Young, Corley & Dolan, 115 Broadway, New York City, engineers and manufacturers' agents, for prices and deliveries on 20 Brown & Sharpe OO type automatic screw machines or equivalent. These tools may be either new or second hand. The Ditwiler Mfg. Co., Galion, O., is in the market for a complete line of machine shop equipment. The Atlas Car & Mfg. Co., Cleveland, which recently let several contracts for an extensive plant in Cleveland, is said to be negotiating for considerable equipment. An eastern builder of boring and turning mills has announced a price change on all machines built by that company. This increase amounts to practically 25 per cent and will be effective immediately. Small lathes, hack saw machines, small air compressors and tools, grinders and milling machines are finding a ready market and deliveries on some of this equipment are little better than they were three months ago.

Cincinnati Tool Sales Exceeding Previous High Record

A GENERAL report of machine tool business compiled by a Cincinnati tool builder, shows that orders taken during the first half of October exceed those of any successive two weeks since last June. Inquiry for all kinds of machine tools for immediate shipment is heavy, and any concern with stock on hand, can dispose of it in short order to local interests at top prices. One large machine tool company reports that practically all orders taken during October have been with domestic consumers. Foreign inquiries continue to enter the Cincinnati market, but manufacturers are showing a strong preference for domestic business. Boilers and tank builders report that sales for equipment to be delivered after the first of the year have been exceptionally good.

Business Looking Up in Chicago

MACHINE tool dealers in Chicago are encountering a strong demand for shop equipment. Sales are being made readily for prompt delivery from stock. In many cases early delivery from the builder may be obtained. Inquiries are coming from practically every section of the west and from a wide variety of users. While a large part of the business is for single tools, one order for eight machines totaling close to $30,000 was closed a few days ago. A contract about to be closed by a western manufacturer for 9-inch shells has resulted in an

Speed coupled with Safety!

If the speeding motorcyclist loses control of his machine—if a part of the machine should let go—something serious is quite apt to happen.

BUT THERE'S A SAFEGUARD AGAINST SUCH HAPPENINGS!

"AGATHON" STEEL is a reliable accident preventative.

It is unexcelled for axles, crank shafts, drive shafts, connecting rods and all other parts of automobiles, motor trucks, motorcycles, etc.

From the selection of raw materials to the very last of the numerous processes necessary for attaining "Agathon" quality, we conduct exhaustive tests to make certain that a state of perfection will be reached.

SAFETY DEMANDS "AGATHON"—MAKE IT OF "AGATHON".

AGATHON STEELS

will serve your purposes BEST

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"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Chrome Steel
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AGATHON STEELS

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Building, - - - - - - - F. Walter Guibert, District Representative
Cleveland Office: Hickox Building, - - - - - - - - The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Building, 14 East Jackson Blvd., - - A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Bldg., - - - - - - - - Frank Wallace, District Representative
J. E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents.

inquiry for about 50 large swing lathes. Initial delivery is promised in 60 days. While recent foreign sales have been consummated by the manufacturers rather than through the dealers, a shipment from the Chicago territory to France was made last week and other orders are under negotiation. The inquiries are principally for large lathes. An increase in price of about 10 per cent has been put into effect by several tool builders. A scarcity of grinders, milling machines, shapers and radial drills continues. The Rockford Automatic Machine Co., lately incorporated, is sounding the market for equipment for its new plant.

Heavy Mill Equipment Continues to be Purchased Freely in Pittsburgh

THE Trumbull Steel Co., Warren, O., has been the most conspicuous buyer of heavy rolling mill and auxiliary equipment in the Pittsburgh district this week. The company awarded contracts for about 5,000 tons of fabricated material to the Riter-Conley Mfg. Co., Pittsburgh, for two buildings, 150 x 450 feet, and 70 x 800 feet, which will house four 100-ton open hearth furnaces to be built by Alex Laughlin & Co., Pittsburgh; four soaking pits; a 36-inch blooming mill and a hot cold strip mill, to be furnished by the United Engineering & Foundry Co.; gas producers and auxiliary equipment. Contracts for nine electric cranes having lifting capacities ranging from five tons to 175 tons, have been awarded to the Alliance Machine Co., Alliance, O. The new plant will furnish steel for the manufacture of sheets, tin plate and special alloy products. The National Tube Co., Pittsburgh, has not yet closed for 27 motor-driven tools, including planing, milling, slotting, boring, drilling and shaping machines and engine and turret lathes, for additions to its works at Lorain, O., and the Westinghouse Machine Co. continues to figure on a long list of tools, previously referred to in these columns.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

AUGUSTA, ME.—The American Button & Fastener Co. has been incorporated to manufacture shoe machinery with $1,900,000 capital by C. L. Andrews, F. B. Turner, L. J. Coleman and M. F. Hearin, Brooks, Me.

BERWICK, ME.—Jackson's Automatic Railroad Device Co. has been incorporated to do a manufacturing business with $1,000,000 capital by Ervin W. Hodsdon, president; Walter R. Tebbetts, treasurer, and Edward F. Gowell, clerk.

EPSON, N. H.—The Barmer Web Co.'s factory and contents were destroyed by fire with a loss of $50,000.

GOSSVILLE, N. H.—Fire destroyed the 3-story factory of the Factory Narrow Fabric Co., maker of looms, causing $100,000 loss.

NASHUA, N. H.—The Improved Paper Machinery Co. will build a 3-story, 48 x 50-foot machine shop.

NASHUA, N. H.—A 1-story, 20 x 100-foot foundry addition is planned by the Flather Foundry Co.

CHESTER DEPOT, VT.—John A. McGuire will start work soon on a machine shop addition.

EAST MIDDLEBURY, VT.—The Bread Loaf Mountain Power Co. is planning to build a $300,000 hydro-electric plant. Address the company in care of Chas. M. Thompson, Montpelier, Vt.

ATHOL, MASS.—The Union Twist Drill Co. has awarded a contract for a reinforced concrete, 2-story, 60 x 100-feet and a 3-story, 60 x 100-foot additional buildings at its plant.

BLACKSTONE, MASS. — Charlotte Bros. have plans for a foundry.

BOSTON.—The Silex Co., electrical machinery, has been incorporated with $150,000 capital by John T. O'Hare and others.

BOSTON.—The Signal Motor Truck Co. of New England has been incorporated with $100,000 capital by Charles C. F. Henderson, George W. Tibbets and others.

BOSTON.—The Prosser Co., mechanical and electrical engineering, has been incorporated with $250,000 capital by Robert W. Scott, Philip Reynolds and Nathan Heard.

BOSTON.—Lehnert Textile Machinery Co., has been incorporated with $10,000 capital by H. H. Lehnert, president; George Blaneey, treasurer and W. J. E. Sander.

BOSTON.—The Associated Tire Manufacturers, Inc., has been incorporated with $5,000 capital by Harold W. Mackiernan, Onset, Mass., president and treasurer; E. E. Mackiernan and H. J. Pettibone.

BOSTON.—A $2,000,000 sugar refinery, comprising six buildings, will be erected here. The United Fruit Co., Boston, is the owner and the Revere Sugar Refining Co., also of Boston, is lessee. Wm. Higginson is architect.

BROCKTON, MASS.—A $30,000 office building and a 1-story, 32 x 45-foot boiler house will be erected by the Bay State Metal Corporation.

FALL RIVER, MASS.—A silk weaving plant will be erected and operated at this place by a company to be known as the Kaplan Silk Co. It is understood that the enterprise is backed by the Baker Silk Co., Paterson, N. J.

FITCHBURG, MASS. — The Universal Grinding Machine Co. has been incorporated with $170,000 capital by Allen Hollis, president; Robert D. Gould, treasurer and Thomas Allen Jr.

GARDNER, MASS.—The Simplex Time Recorder Co. has completed plans for a $30,000, 3-story factory building, which will double the company's present floor space.

HUDSON, MASS.—The Universal Boring Machine Co. has started work on a 2-story, 2 x 30-foot plant.

LOWELL, MASS.—Work has started on the $40,000 addition to the plant of the Massachusetts Cotton Mills. The building will be two stories high, 64 x 290 feet.

LOWELL, MASS.—The contract for a mill addition has been awarded by the Merrimack Mfg. Co., fabrics. The plans call for a structure 1-story, 41 x 131 feet, costing about $10,000.

LYNN, MASS.—The Aerial Contracting Co. has been incorporated with $25,000 capital by L. A. Walker, president; Henry B. Walker, Wollaston, treasurer and C. M. Ludden.

NEW BEDFORD, MASS.—A 100 x 200-foot, 2-story addition will be erected at the plant of the Nashawena Mills Co., silk and cotton manufacturers, in this city.

MALDEN, MASS.—Work is about to commence on a $5,000, 3-story addition to the mills of the Malden Knitting Mills, Inc.

QUINCY, MASS.—The Wollaston Foundry Co. is receiving bids for the erection of a foundry. L. W. Newell, Boston, is treasurer of the company.

SPRINGFIELD, MASS. — The Hampden Hotel Co. plans to build a brick, 8-story addition to Hotel Kimball to cost $250,000.

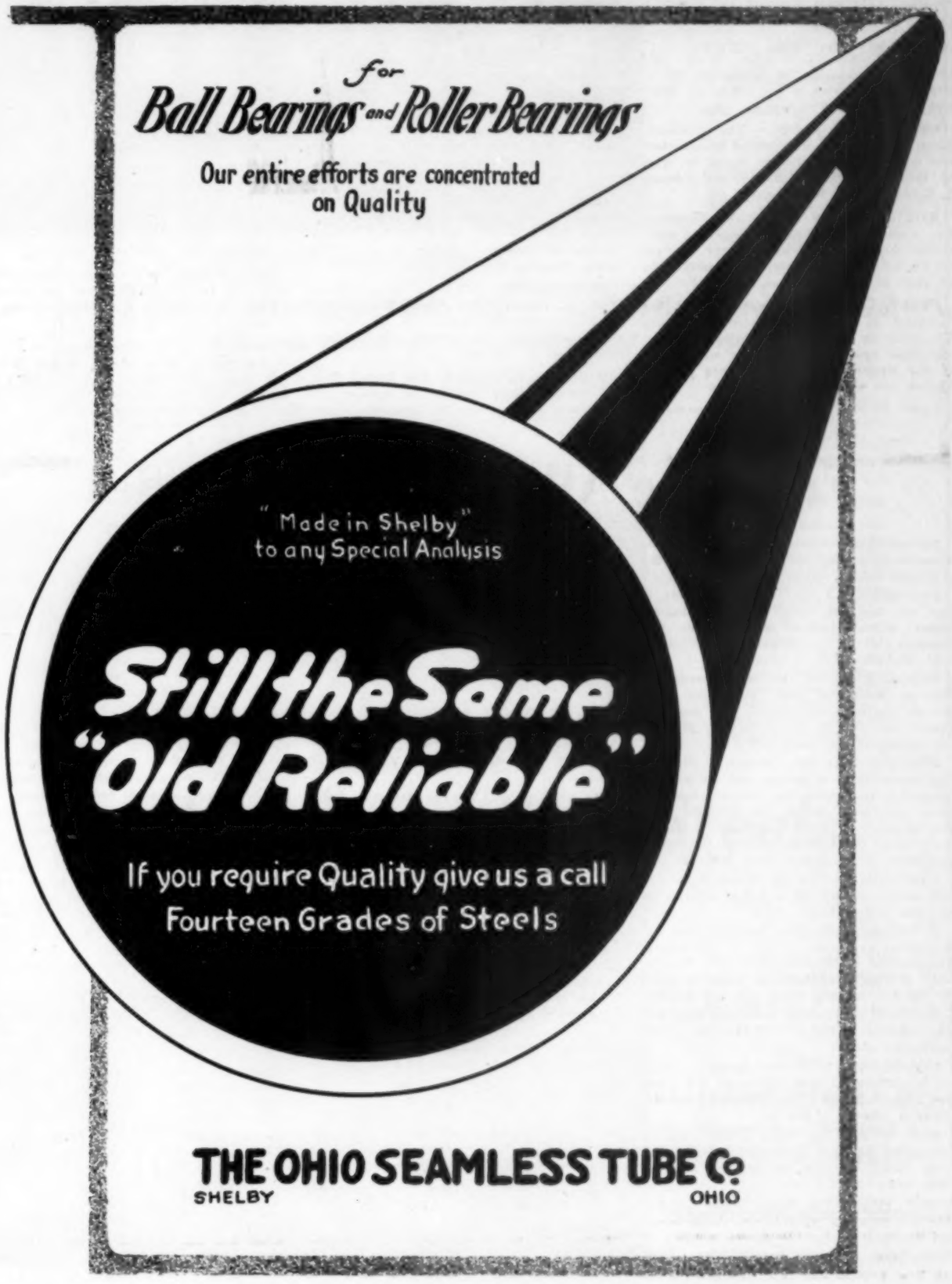
SPRINGFIELD, MASS.—Barney & Berry Co., skate manufacturer, has awarded contract for a brick, 4-story, 16 x 43-foot addition to its factory on Broad street.

SPRINGFIELD, MASS.—The Wm. Carter Co. has plans in progress for a $40,000, 1-story, boiler-house, 60 x 60 feet. Henry M. Hope Pc'son, is engineer.

PROVIDENCE, R. I.—The Nitro-Tungsten Lamp Co. has been incorporated with $50,000 capital by William L. Studley, John E. Canning and Henry C. Hart.

BRIDGEPORT, CONN. — The Bridgeport Brass Co. has let the general contract to S. W. Hubbell Building Co. for a 1-story, 40 x 60-foot casting shop.

"OHIO SPECIAL"
Cold Drawn Seamless Steel Tubing


for
Ball Bearings and Roller Bearings
Our entire efforts are concentrated on Quality
"Made in Shelby" to any Special Analysis
Still the Same "Old Reliable"
If you require Quality give us a call
Fourteen Grades of Steels
THE OHIO SEAMLESS TUBE Co
SHELBY
OHIO

Say you saw it in THE IRON TRADE REVIEW

PROVIDENCE, R. I.—The Stephens Aeroplane Co. has been incorporated to manufacture aeroplanes with $100,000 capital by Bruneau Stephens, Arnold B. Stephens and Lorne E. Stephens.

PROVIDENCE, R. I.—The American Silk Spinning Co. will erect a 2-story addition to its plant. The main structure will be 83 x 140 feet, with ells 18 x 22 feet and 18 x 45 feet.

BRIDGEPORT, CONN.—The A. H. Nilson Machine Co. has let a contract for a second story addition to its factory on Bostwick avenue.

BRIDGEPORT, CONN. — The Cornwall-Elliott Co. has been incorporated to manufacture tools, etc., with $100,000 capital by John H. Eliott, Frederick A. Bartlett and Edward S. Cornwall, New Haven, Conn.

BRISTOL, CONN.—The New Departure Co., manufacturer of ball bearings and automobile accessories, has awarded the contract for the erection of a 2-story, brick addition to its plant at Elmwood.

DERBY, CONN.—The Derby Mfg. Co. has purchased the property of the Anatomik Shoe Co., adjoining its plant which it will remodel and install new machinery for the manufacture of war munitions. It is now using the old Shelton bolt works for that purpose.

EAST CANAAN, CONN.—The Connecticut Chemical Co. is erecting two steel, tile-brick and cement, 82 x 172-foot and a 50 x 100-foot buildings to cost $250,000, which will be leased to the Barnum Richardson Co., maker of car wheels, for the manufacture of wood alcohol and acetate of lime.

EAST HARTFORD, CONN.—The Noble & Westbrook Mfg. Co. has completed its new addition and now is branching out the drop forge business.

HARTFORD, CONN.—The Clamping Devices Mfg. Co. has been incorporated with $75,000 capital by Frank M. Villa, Joseph M. Motto, A. M. Leroy and Robert A. Frederick.

HARTFORD, CONN.—The Standard Oil Co. will build a distributing plant and refinery to cost $1,000,000 on Wawarme avenue, where it has bought 23 acres of land.

HARTFORD, CONN.—A permit has been granted to the Aberthaw Construction Co., Boston, for a 4-story, 120 x 500-foot factory building on Huyshope avenue for the Colt's Patent Firearms Mfg. Co., to cost $350,000.

HUNTINGTON, CONN. — The Holmes Mfg. Co., Shelton, Conn., has been incorporated with $10,000 capital by Leslie W. Holmes, Charlotte E. Holmes and William Holmes, all of Shelton.

MIDDLETOWN, CONN.—The Russell Mfg. Co., cotton webbing, has let the contract for a $40,000, 2-story plant addition, 144 x 144 feet. The new structure will not be equipped before spring. The company also has plans for a new power plant to replace the present power station.

NEW BRITAIN, CONN.—The Barnes & Kobert Co. has awarded the general contract on a forge shop and galvanizing building, 60 x 200 feet, to B. H. Hibbard Co.

NEW BRITAIN, CONN.—The contract for the superstructure of the new factory of the Beaton-Cadwell Mfg. Co. to be erected here has been awarded to Lewis A. Miller. Plans call for a structure of concrete, six stories, 42 x 110 feet.

NEW HAVEN, CONN.—The Winona Mills Hosiery Corporation has been incorporated with $200,000 capital to manufacture hosiery in this city. Among the incorporators are: Jefferson A. Simons, New Haven; and Andrew D. Saekeld, New York.

NORWALK, CONN.—G. S. Roth & Son Co., New York City, textile manufacturer, will increase its plant capacity in this city.

STONINGTON, CONN.—The Atwood Machine Co. has awarded contract for a brick and wood, 3-story, 65 x 125-foot addition to its factory to cost $40,000.

VALDESE, CONN.—The erection of an additional mill is being planned by the Valdese Mfg. Co., which will be equipped with 5,000 spindles and accompanying machinery for manufacturing cotton hosiery yarns.

From the Alleghenies to the Sea

BROOKLYN.—Architect I. J. Feinberg, 423 Pennsylvania avenue, has plans in progress for a $75,000, 4-story factory, 100 x 160 feet.

BROOKLYN. — The Gotham Machine & Tool Co. has been incorporated with $10,000 capital to manufacture machine tools and hardware by M. J. Balander, H. Charnes, 2533 Madison street.

BROOKLYN. — The Mallory Consolidated Knitting Mills has been incorporated with $20,000 capital to manufacture knit goods in Passiac, N. J. W. H. Schleicher, of that city, is one of the incorporators.

BUFFALO.—The Acme Pattern & Machine Co., manufacturer of knitting and silk weaving machinery, has started the erection of a fireproof plant, estimated to cost $100,000, without machinery or other equipment. It is expected that the building will be ready for installation of equipment about Nov. 15.

CARTHAGE, N. Y.—The Island Paper Co. will build a 1-story, 40 x 80-foot addition to its mills.

DUNKIRK, N. Y.—The Dunkirk Glass Co. is planning to double the size of its factory. The principal addition will be 2-story, 80 x 200 feet. William Washington is preparing plans for the new building which will cost $25,000.

FULTON, N. Y.—The Arrowhead mills will take sub-bids shortly on a 1-story, 40 x 50-foot power plant.

JAMESTOWN, N. Y.—The Jamestown Chair Co. is planning to erect a 3-story, 80 x 200-foot plant addition. The builders are McGinity & Johnson, of this city.

NEW YORK.—The Globe Thread Co. is understood to have purchased property in Long Island City for the erection of a 4-story mill.

NEW YORK.—The Rainer Motor Corporation has purchased property on Long Island and will erect a plant for the manufacture of motor trucks. Plans for two buildings, costing about $53,000, have been prepared. One building will be 50 x 100 feet and the other 200 x 200 feet. The first is to be completed 30 days after the contract is let, and the second building by Dec. 1. The executive offices of the corporation will be at the Flushing factory.

NIAGARA FALLS, N. Y.—The Titanium Alloy Mfg. Co. is receiving bids on the erection of a 1 and 2-story boiler house, 46 x 53 feet.

NIAGARA FALLS, N. Y.—Colson & Huckson, Buffalo, now are ready for bids on the construction of a $7,000, 1 and 2-story boiler house for the Titanium Alloy Mfg. Co., of this place.

ROCHESTER, N. Y.—The Bausch & Lomb Optical Co. has plans completed for a $6,500, 1-story plant addition, 70 x 120 feet.

SCOTTSVILLE, N. Y.—Engineer Howard Cutler, Rochester, N. Y., has plans in progress for paper mill alterations and additions and also a new power house, costing $35,000, for the Flower City Tissue Mills Co. of this city.

BAYONNE, N. J.—The Tozzi Mfg. Co. has been incorporated with $20,000 capital to manufacture dies, by C. A. Robinson, R. O. Phillips and A. M. Tozzi.

CAMDEN, N. J.—R. B. Brown & Co. has been incorporated with $35,000 capital to manufacture talking machines and musical instruments, by E. B. Brown, Philadelphia, P. M. Satterhwaite, Lansdown, Pa., and W. H. Payne, Wynnewood, Pa.

JERSEY CITY, N. J.—The Nu-Style Window Sash Co. has been incorporated with $200,000 capital to manufacture window sashes and accessories, by C. H. Jarvis, Philip L. Mieser and J. N. Turner.

NEWARK, N. J.—City engineer, Morris R. Sherrerd has plans under way for a 1-story, 200 x 300-foot incinerator and power plant.

NEWARK, N. J.—The DeCamp & Sloan Co. has been incorporated with $100,000 capital to manufacture machinery and hardware, by A. T. Sloan and H. S. Sloan, Mont Clair, and W. R. DeCamp, Roseland.

NEWARK, N. J.—The Martin Dennis Co. has started work on the erection of a plant addition which will involve an expenditure of about $25,000. The structure will be of brick, two stories high, 45 x 160 feet. William G. Sharwell & Co. have the general contract.

NEWARK, N. J.—The Marden, Orth & Hastings Co. will build a 2-story, brick addition to its chemical plant which will cost about $20,000. Marshall N. Shoemaker designed the plans for the structure, which, when completed, will provide an ice plant and storehouse.

PASSIAC, N. J.—The Passiac Cotton Mills, according to reports, will erect a 2-story, 124 x 488-foot mill at New Bedford, Mass.

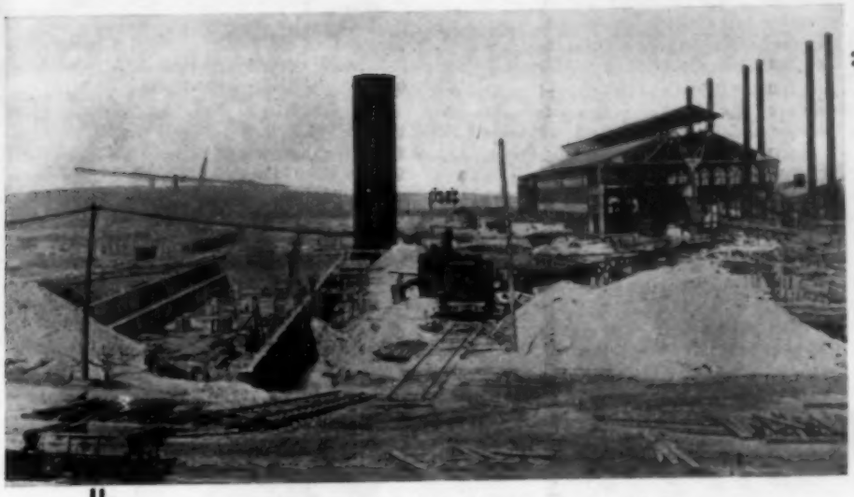
PASSIAC, N. J. — The Botany Worsted Mills has purchased additional property and it is understood the company will erect buildings costing about $250,000.

PATERSON, N. J.—F. C. Reinhardt, owner, is taking bids on the construction of a 4-story factory building, 60 x 300 feet, with wing, 60 x 140 feet.

PLAINFIELD, N. J.—A $10,000 machine shop, two stories high, 60 x 100-foot, will be erected by Laing Machine Auto Repair Co.

BEAVER FALLS, PA.—The Pittsburgh Radium Co., a newly-organized interest, has purchased the plant of the Great Western File works and plans to remodel the plant and equip it for the treatment of carnotite ores and the extraction of vanadium, uranium and allied products. The officers of the company are: President, Samuel Jeffrey, Ithaca, N. Y.; vice president, G. E. Erb, and secretary, W. J. Stevenson, both of Pittsburgh.

CHESTER, PA.—The Sun Shipbuilding Co. is about to start work on a $10,000, 1-story plant addition, 60 x 128 feet.



Open Hearth and Blooming Mill buildings under construction, June 1

These illustrations will convey to you some idea of the strenuous efforts we are making to keep pace with the demand for "United" Alloy Steels.

The Foundation of "United" Service

Efficient equipment and experienced organization

Open Hearth and Blooming Mill buildings, July 7

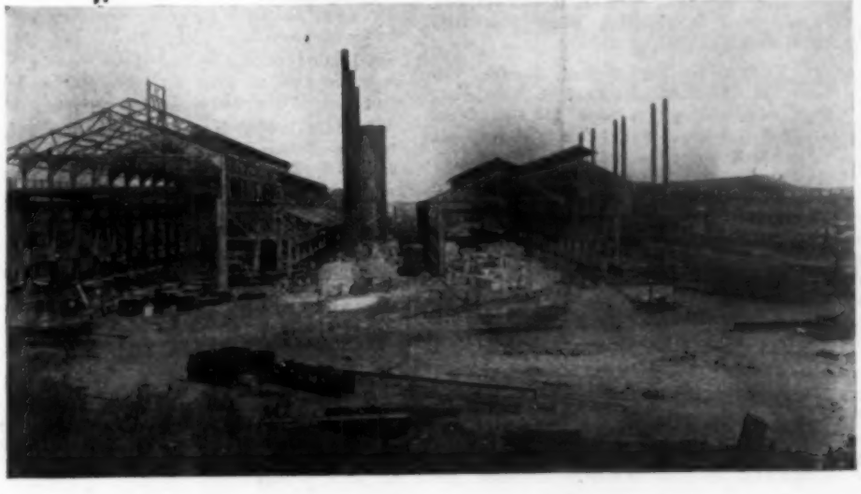
We are now building and will soon complete a new unit which is in itself a complete steel plant, and which will triple our present output.

This plant includes blast furnaces, coke-ovens with by-products, open hearth furnaces, finishing mills, a heat treating department and a new cold drawing plant.

We will be able to completely control our product from the ore to the finished heat-treated and cold drawn bar, thus insuring the buyer of "United" Alloy Steels, a uniform high grade product of any analysis and finish.

United Alloy Steels

Open Hearthand Blooming Mill buildings, Sept. 25



When these additions are finished we will be able to take care of **your** business.

The United Steel Co.

Specialists in Alloy Steel

CANTON, OHIO

CORRY, PA.—United States Radiator Co. has awarded C. R. Rogers & Co. a contract for the steel work for a foundry.

ERIE, PA.—The German Bronze Co. plans to build an addition to its plant at Nineteenth and Chestnut streets, to cost about $40,000. L. T. Briggs is president of the company.

ERIE, PA.—The Hammermill Paper Co. plans to build a 3-story power plant, 88 x 116 feet, to cost about $50,000. The Osborn Engineering Co., 740 Engineers building, Cleveland, is the consulting engineer.

HAZELTON. — An $85,000 addition is planned by the Lewis, Reesel Co., to its silk mill.

HOMESTEAD, PA.—Lodge No. 582 of the Masonic Order plans to build a temple, to cost $50,000. M. Nirdlinger, Diamond Bank building, Pittsburgh, is preparing the plans.

JEANNETTE, PA.—The school board plans to issue $175,000 bonds for erecting a school on Gaskill avenue.

JOHNSTOWN, PA.—The city council proposes to erect a bridge between Johnstown and Conemaugh which will cost approximately $210,000.

JOHNSTOWN, PA.—Mercy hospital plans to build a 4-story addition, 80 x 100 feet, to cost about $50,000. H. Hornbostel, William street, New York, is preparing the plans.

MUNHALL, PA.—The board of education is receiving bids for an addition to the Munhall high school building, to cost $75,000.

NEW CASTLE, PA.—The Standard Steel Car Co., Mahoning avenue, has appropriated $300,000 for additional buildings and facilities.

PHILADELPHIA.—A $12,000 plant addition is being planned by the Philadelphia Paper Co.

PHILADELPHIA.—Walker & Davis, machinists, have let the general contract for a $10,000 1-story plant.

PHILADELPHIA.—The United States government has plans in progress for a $24,000, 1-story addition to the Frankford arsenal.

PHILADELPHIA. — The Smith, Hardican Co. is estimating plans on a 1-story machine shop 18 x 100 feet, that will be erected at 140 North Juniper street, for E. J. Collins.

PHILADELPHIA.—John Sjostrom & Co., Inc., cabinet makers, are taking sub-bids on a $30,000, 3-story factory addition, 118 x 158 feet.

PHILADELPHIA. — The Lebanon Valley Iron & Steel Co. has authorized the erection of a 9 and 12-inch rolling mill plant. The contract has been awarded to J. K. Petty & Co., Philadelphia.

PHILADELPHIA.—Alvin Lederer, treasurer, Alco Silk Co., Paterson, N. J., has leased the mill at Lebanon, Pa., formerly occupied by the Cumberland Silk Co. An equipment of 24 looms is to be installed and operations are expected to commence about Nov. 15.

PITTSBURGH.—The Iron City Brewing Co. plans an addition to its bottling plant in Thirty-fourth street, to cost about $35,000.

PITTSBURGH.—The Weston Glass Co. has been incorporated with $50,000 capital to manufacture glass, by R. S. Giese, C. V. Arbogast et al.

PITTSBURGH.—The Bailey Reflector Co. has been incorporated to manufacture sheet metals, lighting fixtures, signs, etc.; $30,000 capital stock; by J. Chalmers Stehley, O. R. Degelman and J. E. McCalmonte, Pittsburgh.

PITTSBURGH.—The Carnegie Institute of Technology will soon award contracts for additions to the School of Applied Science, to cost about $500,000. E. Stotz, Monon Bank building, is preparing the plans.

PITTSBURGH.—A site has been purchased by the board of education near the new Schenley High school for erecting a stadium, to cost about $500,000. George W. Gerwig is secretary of the board of education.

PITTSBURGH.—The McAlister Bros. Co. has awarded the Fetzer-Winger Co., Bessemer building, a contract for erecting a 3-story and basement, 74 x 150 feet, service station and repair shop on Baum boulevard, to cost $95,000.

PITTSBURGH. — The Keystone Seamless Tube Co. has been incorporated to manufacture and deal in all kinds of iron and steel products; $20,000 capital stock; by A. M. Thompson, Gibsonia, Pa.; H. Stewart Dunn, Pittsburgh, and Roy Rose, Sewickley, Pa.

UNIONTOWN, PA.—Fayette county plans to construct a passenger bridge over the Monongahela river, between Fayette City and Allenport, to cost about $200,000.

UNIONTOWN, PA. — Board of education plans to build a 3-story high school, to cost about $60,000. H. W. Altman, 525 First National Bank building, is preparing the plans.

WILMINGTON, DEL. — The MacFarlane Motor Corporation has been incorporated with $3,000,000 capital to manufacture cars, locomotives and automobiles, by H. E. Latter, N. P. Coffin and C. M. Egner.

CUMBERLAND, MD.—The Western Maryland railroad will spend $300,000 shortly in establishing repair shops at this place. The property already has been acquired.

Activities in the Central States

BELLAIRE, O.—The Kochline Ice Co. will expend $25,000 improving its plant. A storage house, 5,000 tons capacity, and new tanking facilities will be added.

CANTON, O.—The Canton Auto Parts Co. has been incorporated with $300,000 capital to manufacture piston rings. The company will erect a plant in Canton to have a capacity of 20,000 rings daily.

CANTON, O.—The Timken Roller Bearing Axle Co. has plans for an addition to its tube plant. The addition will be a steel mill structure, 100 x 350 feet, and will be equipped to handle cold drawn steel bars.

CINCINNATI.—Plans for a plant for the Carlton Machine Tool Co., 90 x 186 feet, to be built on Spring Grove avenue, have been placed upon the market. The company has not purchased all equipment needed.

CINCINNATI.—The United States Machine Tool Co. will build a 1-story plant 73 x 90 feet, near Sixth street and Burns place. The company, which makes parts for machine tools, is occupying temporary quarters at Sixth street and Mt. Hope road.

CINCINNATI.—The Ohio Mold & Foundry Co., recently incorporated with a capital stock of $100,000, is negotiating for the old plant of the Lane & Bodley Co., at Tennessee avenue and Paddock road. As yet no definite arrangements have been made. The company will make ingot molds.

CINCINNATI.—Application for a building permit has been made for the construction of a new Y. M. C. A. building to cost $270,000 exclusive of an annex to contain the power plant which will cost $30,000. The building will be concrete supported by steel. General contract let to the Ohio Building & Construction Co., this city.

CINCINNATI.—Fully $50,000 will be spent for equipment by the Stevens Pressed Brick Co., which soon will be incorporated with a capital stock of $100,000. The company will soon purchase a site in this city, and erect a plant. Fremont C. Stevens will be president. Pressed brick will be made from cinders by means of a patented process.

CLEVELAND.—The Tabor Ice Cream Co. has recently been reincorporated with a capital of $2,000,000. The present plant will be improved by an expenditure of $100,000.

CLEVELAND. — The Vitreous Enameling Co. has purchased a site on Grant avenue and will erect an enameling plant to cost $50,000. Samuel Weil is president, offices East Ohio Gas building.

CLEVELAND.—The Willard Storage Battery Co., T. R. Cook, chief engineer, will erect two buildings to cost $100,000. One building will be 2-story 135 x 200 feet and the other 1-story 90 x 240 feet.

CLEVELAND.—W. C. Owen, 1900 Euclid building, is working on plans for a rubber factory and power plant for the Westguard Tire & Rubber Co., to be erected at Warren, O. The cost of the factory will be $200,000. A. L. Westguard, 50 Broad street, New York, is president of the company.

DAYTON.—The Dayton Power & Light Co. soon will award contracts for the super-structure for its electric light and power plant. The structure will be 2-story, 100 x 250 feet. The estimated cost of the entire project is $1,000,000. Thomas R. Murray, 130 East Fifteenth street, is architect and engineer.

ELYRIA, O.—The Western Automatic Machine Screw Co. will erect a 1-story, cold-drawn steel plant, steel and concrete construction, to cost $40,000.

LIMA, O.—The Lake Erie & Western railway is planning to erect several shops to cost $500,000.

LORAIN, O. — The Pennsylvania railroad has announced that it will build a round house and machine shop at Lorain. Plans are now being prepared by Chief Engineer Thomas Rodd, Pittsburgh.

PORTSMOUTH, O.—County commissioners will receive bids for constructing a bridge at Harrisonville avenue, village of New Boston. S. D. Eckhart is county auditor.

PORTSMOUTH, O.—Board of education is receiving bids for the erection of a school to cost about $60,000. Ritter & Bates are preparing the plans.

YOUNGSTOWN, O.—The Home Savings & Loan Co. plans to erect a 12-story building at West Federal and South Chestnut streets.

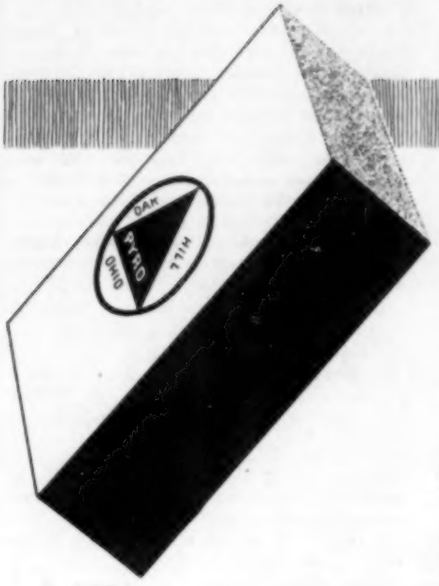
YOUNGSTOWN, O.—City council plans to erect an addition to the municipal building to cost about $11,000. Stanley & Scheibel are preparing the plans.

YOUNGSTOWN, O.—City Engineer Frank Lillie states that plans have been started for the Cedar street bridge. The structure will be of steel girder construction, 700 feet long, 30-foot roadway and 8-foot sidewalks.

FAIRMONT, W. VA.—The Fairmont Chemical Co. plans to build a plant, to cost about $85,000. L. A. Thiele, Columbus, O., is engineer.

FAIRMONT, W. VA.—The Fairmont Mining Machinery Co. has awarded the McClintic-Marshall Co., Pittsburgh, a contract for a factory, 90 x 120 feet, and pattern storage building, 40 x 60 feet.

Prompt Shipment Today! Why Suffer Delay?



"PYRO STEEL" FIRE BRICK

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Because of late increases in capacity
PYRO can give you brick
just when you want them.

PYRO makes only High Grade Fire Brick
for Steel Furnaces,
and Blast Furnaces,
and Forge Furnaces,
and other places where it's so—well, so awfully hot
that only a really good brick is worth a—well, you know.

If you don't believe this,
you can ask some users whose names we will send you—if you ask us to.

The PYRO CLAY PRODUCTS Co.

OAK HILL, OHIO.

MORGANTOWN, W. VA.—The state board of control plans to erect a building at the West Virginia University, to cost about $300,000. P. A. Davis, 1713 Sansom street, Philadelphia, is preparing the plans.

PARKERSBURG, W. VA.—The Kanawha Traction & Electric Co. plans to issue $1,700,000 bonds, $40,000 of which is for improvements.

BRAZIL, IND.—The Wood Turret Machine Co. will build an addition to its factory 60 x 280 feet, two stories. Cost, $10,000.

INDIANAPOLIS.—The Holcomb & Hoke Mfg. Co., 1453 Van Buren street, will build a machine shop and automobile plant.

INDIANAPOLIS.—The Metal Auto Parts Co. will build a factory costing $80,000 on a four-acre tract. The enameling plant will have 20 ovens. B. E. Thompson is president.

INDIANAPOLIS.—The Permalite Corporation has been incorporated to manufacture batteries and automobile accessories with $100,000 capital by E. B. McNabb, Charles S. Shotwell and E. C. Bacon.

CHICAGO.—The Chicago Hardware Foundry Co., 546 West Washington boulevard, will build an addition.

CHICAGO.—The Metal Specialties Co.,3200 Carroll avenue, is building a 4-story plant, 100 x 160 feet, to cost $100,000.

CHICAGO.—The Douglas Iron Works has been organized with $100,000 capital by Isadore Brown, E. Peterson and Irving Zimmerman, 155 North Clark street.

CHICAGO.—The Burnside Steel Co. has been incorporated with $100,000 capital. Land has been purchased and a plant soon will be erected. The office of the company is at 548 Railway Exchange building. President H. F. Wardwell.

CHICAGO.—The sanitary district of Chicago, 910 South Michigan avenue, will build a draw span bridge at California avenue and Chicago river of steel and reinforced concrete, 316 feet long with 37-foot roadway, on which bids will be asked soon.

CHICAGO.—Davidson & Weiss, architects, 53 W. Jackson boulevard, will take bids about Nov. 1 on a manufacturing plant, including a gray iron foundry, machine shop, pattern shop and other structures costing $150,000, owner's name being withheld.

METROPOLIS, ILL.—The Wilson Stove & Mfg. Co. has been incorporated with $100,000 capital stock by James Wilson, James B. Wilson and S. H. Long.

ROCKFORD, ILL.—The Union Products Co. has been organized by A. A. Martin and associates and will manufacture automobile accessories.

DETROIT.—The Detroit Bearing & Casting Co. will enlarge its plant.

DETROIT.—The Detroit Metallic Casket Co. will erect a factory 120 x 130 feet to cost $40,000. F. A. Czeschinsky, Goeshel building, is architect.

DETROIT.—The Metalwood Mfg. Co., builder of high-speed machinery, is building an addition to its plant and installing new equipment. William R. Keen is secretary.

DETROIT.—The Randolph-Pennington-Davis Machine Co. has been incorporated to manufacture machinery by Gordon M. Pennington, E. W. Randolph and Edward Davis.

GRAND RAPIDS, MICH.—The Ideal Foundry Co. will build a pattern shop.

HOLLAND, MICH.—The Holland Furnace Co. will erect a new foundry 60 x 230 feet.

KALAMAZOO, MICH.—The Kalamazoo Malleable Iron Co. will erect a new plant to cost $125,000. The structure will be 1-story, 250 x 300 feet. D. J. Albertson, East Main street, is architect.

MONROE, MICH. — The Monroe Binder Board Co. soon will begin the construction of a $400,000 plant. L. W. Newcomer, an official of the company, states that the immediate outlay will be considerably increased by other additions at a later date.

ST. JOSEPH, MICH.—The Michigan Malleable Mfg. Co. will build a machine shop.

BEAVER DAM, WIS.—The Western Malleables Co., railroad and automobile castings, is improving its works at Beaver Dam. The Elm street plant is being enlarged by a brick and steel addition, 26 x 90 feet, and a new and larger core room and sand shed. An air compressor room is being erected at the South street plant.

BURLINGTON, WIS.—The Osborne Casting Co. will erect a $20,000 foundry on Larard avenue.

EAU CLAIRE, WIS.—The Dumphy Boat Works has received permission from the common council to build a new boat factory on Water street.

GREEN BAY, WIS.—The Cargill Grain Co., Milwaukee and Minneapolis, is considering the erection of a grain elevator in connection with the Green Bay & Western Railroad Co. on the Fox river to take the place of the 1,750,000 bushel house recently destroyed by fire. E. J. Grimes, Milwaukee, is manager for Cargill's.

MADISON, WIS.—The Capital Culvert Co. will rebuild its burned plant at a cost of about $20,000.

MILWAUKEE.—The Lakeside Bridge & Steel Co. of North Milwaukee, is building additions to double its fabricating and erecting plant.

MILWAUKEE.—The Briggs & Stratton Co. will build a plant costing $100,000 for the manufacture of automobile specialties and electrical devices.

MILWAUKEE.—A new machine shop costing about $10,000, will be erected on South Pierce street, near Seventh avenue, by J. George Shaw, manager of the Milwaukee Steel Foundry Co., 157 Virginia street. It will be of reinforced concrete and brick, 50 x 75 feet.

NEW RICHMOND, WIS.—The New Richmond Roller Mills Co., flour and feed, sustained a loss estimated at from $175,000 to $200,000 by the destruction of its plant by fire Oct. 3. The loss is covered by insurance and the 500-barrel mill and 100,000 bushel elevator will be rebuilt as soon as adjustments are completed.

RACINE, WIS.—The Harvey Spring & Forging Co. will build a plant 100 x 200 feet. W. T. Harvey is secretary.

SUPERIOR, WIS. — The Great Northern railway is completing the work of building new yards on Twenty-eighth street, Superior, and will then treble the size of its repair shops at this point. The oldest of the Great Northern ore docks in Allouez bay will be modernized and rebuilt of concrete and steel during the coming winter.

KANSAS CITY, MO.—The Bapst Motor Co., incorporated with $15,000 capital, will equip a machine shop and repair shop. G. E. Abernathy is interested.

KANSAS CITY, MO.—The contract will be let soon for a 700-foot steel or reinforced concrete bridge in Swope Park at a cost of $160,000. Waddell & Sons, Kansas City, are engineers.

ST. LOUIS.—The Anheuser Busch Brewing Association, A. A. Busch, president, has let a general contract to the Gilsonite Construction Co. for a 7 story building 250 x 580 feet, to cost $1,500,000. Sub-contracts will be let shortly.

COUNCIL BLUFFS, IA.—The Droge Elevator Co., 520 Pearl street, is planning to build a steel and concrete warehouse costing $50,000.

MUSCATINE, IA.—The Iowa Culvert Sheet Metal Co. is planning to build an addition.

ST. PAUL.—The C. J. Johnson Mfg. Co. will build a 2-story factory for the manufacture of printers' machinery and supplies costing $10,000.

In the South and Around the Gulf

BRISTOL, VA.—The Bristol Chemical Co., recently incorporated with $50,000 capital, has secured a building in this city and is not buying equipment.

WINCHESTER, VA.—The Virginia Woolen Co. has started work on an addition which doubles the floor space of its plant.

BESSEMER CITY, N. C.—The Huss Mfg. Co., manufacturer of fine damasks, is erecting an addition to its plant which will be 50 x 100 feet, two stories high.

CHARLOTTE, N. C.—The North State Knitting Mills Co., Durham, N. C., has awarded the contract for a $6,000 addition to its plant. About 100 knitting machines will be added, and of this number 25 have already been purchased.

EAST DURHAM, N. C.—The Emery Hose Mills Co. has been organized by J. H. Emory. The company will install 38 knitting machines.

GASTONIA, N. C.—It is reported that C. B. Armstrong, of this city, is planning to organize a stock company with $150,000 capital to build a 6,000-spindle cotton mill near Gastonia.

RALEIGH, N. C.—The Cotton Mills Co. has awarded contracts for plant additions estimated to cost $50,000. The proposed structures are as follows: Two-story, 50 x 90-foot extension to finishing department building; 2-story, 54 x 75-foot picker building; 1-story, 25 x 60-foot addition to dyehouse; and addition to warehouse.

DAYTON, KY.—The Wadsworth Watch Case Co. will make extensive alterations in its plant which will necessitate the purchasing of some new machinery.

LOUISVILLE, KY.—The Visible Measure Gasoline Dispenser Co. has been incorporated with $40,000 capital by J. H. Brady, W. A. Earl and W. A. Fell.

LOUISVILLE, KY.—The Louisville Provision Co. has taken out a permit to erect a 3-story, 50 x 82-foot addition to its plant to cost $40,000.

LOUISVILLE, KY.—The Illinois Central railroad is preparing plans for shop buildings and power house to be located in this city. A. S. Baldwin, 135 East Eleventh place, is engineer.

DALLAS, TEXAS.—The Dallas Boiler Works has been incorporated with $50,000 capital by F. E. Austin, C. R. Moore and W. J. Wyatt.

FT. WORTH, TEX.—The city of Ft. Worth will construct a subway under Main street at a cost of $250,000.

OKLAHOMA CITY, OKLA.—The L. & M. Paper Box Co. has been incorporated with $50,000 capital by C. H. Long, W. L. Mautin and J. H. Stumpff.

Western and Intermountain Territory

KANSAS CITY, KAS.—L. R. Ash, city engineer, is planning a viaduct at Seventh street to cost $250,000.

TOPEKA, KAS.—Bids will be received until Oct. 30 by O .K. Swayze, county clerk, for three reinforced concrete bridges, 45, 60 and 65-foot spans with 16 to 20-foot roadways.

WICHITA, KAN.—The Kansas Gas & Electric Co. is planning to spend $300,000 for improvements at its plant.

CASTLEWOOD, S. D.—Bids will be received soon for a waterworks plant for which $20,000 in bonds has been voted.

GREAT FALLS, MONT. — The Great Northern Railway Co. will erect a 20-stall roundhouse here to cost $80,000.

GREAT FALLS, MONT.—The Three Forks Portland Cement Co. plans to construct a 14,000-foot aerial tramway from its holdings on the top of the mountain to its plant at Hanover at an estimated cost of $100,000.

BOULDER, COL.—W. S. Campbell, engineer, Denver, is preparing plans for a hydroelectric power plant in Boulder canyon, to develop 4,000-horsepower and to cost $250,000.

DENVER.—The Denver Rock Drill & Mfg. Co. will build an addition costing $15,000.

SANTA ROSA.—Bids will be received until Oct. 23 for two steel bridges each 140 feet with 16-foot roadway. J. W. Johnson, Santa Fe, is state engineer.

WICKENBURG, ARIZ.—Bids will be received until Oct. 30 by H. P. Ward, town clerk, for an electric plant including a powerhouse and an addition to the waterworks plant.

OGDEN, UTAH.—The Ogden Iron Works has been incorporated to take over the Western Foundry & Machine Co. and add to its plant with a capital of $100,000, by R. B. Porter, L. T. Dee and Joseph Scowcroft.

SALT LAKE CITY. — The International Metal & Rail Co. has been incorporated to manufacture steel rails and ties. The new company is capitalized at $1,000,000 by George B. Wilson, William H. Burnside, E. W. King and others.

MACKAY, IDA.—Fire destroyed the machine shop of the Empire Smelter Co. here causing a loss of $18,000.

Pacific Coast and Western Canada

FRESNO, CAL. — The Pacific Light & Power Co. plans the development of hydroelectric power from Big creek, at a cost of $6,000,000. E. F. Scattergood, Los Angeles, Cal., is the chief engineer.

HUNTINGTON PARK, CAL.—The Warmen Steel Casting Co., Los Angeles, will build a steel foundry at Huntington Park.

PITTSBURG, CAL.—The Columbia Steel Co. will add an open-hearth furnace and plans to install new cranes in its plant.

RIVERSIDE. — The Riverside Specialty Works will build a plant for the manufacture of automobile parts.

SAN LUIS OBISPO, CAL.—The Santa Maria Gas & Power Co. will build and equip a machine shop.

SEATTLE.—The council has added to the levy the sum of $42,000 for the West Waterway bridge.

SEATTLE. — The Seattle Shipbuilding Co. has been incorporated by Samuel F. Racine and G. T. Morgan for $500,000. Plans for a plant on West Waterways are being considered.

SEATTLE.—John Graham, architect, Green building, has awarded a contract to J. J. Agutter & Co., 622 Fourth avenue, for the electric work in the new $1,200,000 building of Frederick & Nelson. The contract approximates $40,000. A car load of pipe and about 500,000 feet of wire will be required.

SEATTLE, WASH. — Surveys have been started for the first unit of the $3,000,000 extension to the water system here. This will call for construction of the Volunteer Park reservoir of reinforced concrete to have a capacity of 50,000,000 gallons and a cost of about $200,000. Bids for the work will be opened about Dec. 1.

EUGENE, ORE. — The Southern Pacific Railway Co. will relay 7½ miles of track on the Wendling branch and make other improvements at a cost of about $27,000.

EUGENE, ORE. — The Oregon Power Co. plans improvements and extensions to cost between $90,000 and $100,000 in the Coos bay holdings of the concern. The company is also planning the extension of a line into the valley of the Coquille river.

GARDINER, ORE.—The Port of Coos Bay, Gardiner, has employed James Polheum, engineer, Portland, Ore., to prepare plans for a suction dredge which will cost about $50,000.

NEWPORT, ORE.—H. Fitzgerald, promoter of the Portland & West Coast Railroad Co., which proposes to construct a line between this point and Portland, has started making the survey.

PORTLAND, ORE.—Bids will be received until Dec. 6 by the city auditor for a reinforced concrete viaduct over the Oregon-Washington railway & Navigation Co.'s tracks, requiring 1,189 tons of reinforcing bars.

NEW WESTMINISTER, B. C.—A formal application for a lease on a portion of Tenth street has been received from Henry Schaake who will erect a modern machine, pattern and boiler shop to cost $20,000 with plant equipment estimated at $50,000.

Need Steel Works and Mill Equipment

Two new companies for the manufacture of steel plates for ships and other shipbuilding requirements have recently been formed in Norway. The larger of the two, the A/S Norskevalseverker, has purchased ground for its plant in Christiansand. Its capital will be from 5 to 10 million dollars and the initial output of the works about 80,000 tons, including 30,000 tons of ship plates and 30,000 tons of rolled sections. The other company, which is as yet unnamed, will have a capital of about $2,140,000 and an annual output of 20,000 tons. The engineer of this latter company has requested the bureau of foreign and domestic commerce, Washington, to place him in communication with American manufacturers of machinery for steel works and rolling mills. Manufacturers of gas generator furnaces are also requested to communicate with him.

New Catalogs

HOISTS AND TROLLEYS.—The Vulcan Engineering Sales Co., Chicago, is distributing a folder describing pneumatic hoists and trolleys manufactured by the O M S Co., Chicago. Hoists of several different types are mentioned in detail, and plain and geared I-beam trolleys are illustrated and described.

FUEL OIL APPLIANCES. — A 28-page bulletin devoted to the extensive line of fuel oil appliances manufactured by the W. S. Rockwell Co., 50 Church street, New York, recently has been issued. Oil burners and their applications are illustrated and described in detail, as well as fuel pumps, blowers, valves, oil pressure tanks, steam separators, steam blowers, etc.

TRAVELING CRANES. — The Shepard Crane & Hoist Co., Montour Falls, N. Y., has issued a bulletin describing the crane equipment in the new laboratories of the Massachusetts Institute of Technology. The new pamphlet contains a panorama of the new buildings and illustrations of the hydraulic, steam and electric laboratories which are equipped with Shepard cranes.

CASINGS FOR SILENT CHAINS.—The Link-Belt Co., Chicago, has issued a small booklet which describes lubricants and casings for silent chain drives. The operation of chain drives is greatly enhanced by proper lubrication, it is stated in the booklet; hence the company recommends that casings be provided which are dust-proof and oil-proof and which lubricate the chain thoroughly as it passes through the oil placed in the bottom of the casing. The booklet is illustrated with views of present installations and diagrams of various casings.

FOUNDRY SUPPLIES.—A comprehensive 352-page catalog, devoted to foundry supplies and equipment, has been issued by the Hill-Brunner Foundry Supply Co., Cincinnati. The introduction to this work is unique inasmuch as it contains numerous notable quotations and the suggestions will prove of value to foundrymen generally. The first section of this catalog is devoted to facings of various kinds with instructions for their application. This is followed by a section devoted to iron filler cements, ferro-alloys of various kinds and foundry sands are next considered. Succeeding sections are devoted to brushes, riddles, shovels, wheelbarrows, chaplets, bellows, mallets, flasks and trimmings, pattern letters, patternmakers' equipment, core compounds, wire cutters, core room equipment, molding machines and accessories, etc. Practically 200 pages are devoted to equipment for the brass, gray and malleable iron and steel foundry. The catalog is unusually complete, is well illustrated and well arranged. Sixteen pages are devoted to helpful suggestions for foundrymen, including an explanation of the elements in iron, methods of making mixtures, data regarding coke, chemical compositions of castings for various purposes, weights and measures, terms applied to electrical units, etc.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)

Bessemer valley	$24.00
Bessemer, Pittsburgh	24.95
Basic, Pittsburgh	20.95
Basic, eastern Pa.	20.50 to 20.75
Basic, Buffalo	20.00
Malleable, Pittsburgh	20.95
Malleable foundry, Chicago	19.50
Malleable foundry, Philadelphia	21.25 to 21.75
Malleable foundry, Buffalo	20.00
No. 1X foundry, Philadelphia	21.00 to 21.50
No. 2 foundry, Pittsburgh	20.95
No. 2 foundry, Cleveland	20.00 to 20.30
No. 2 foundry, Ironton	20.00
No. 2 foundry, Chicago	19.00
No. 2X foundry, Philadelphia	20.50 to 21.00
No. 2X foundry, N. J. tidewater	20.75 to 21.25
No. 2X foundry, Buffalo	20.00
No. 2 plain, Philadelphia	20.00 to 20.25
No. 2 plain, N. J. tidewater	20.25 to 20.75
No. 2 plain, Buffalo	20.00
No. 2 southern, Birmingham	15.50 to 16.00
No. 2 southern, Cincinnati	18.40 to 18.90
No. 2 southern, Chicago	18.00 to 19.00
No. 2 southern, Phila. delivery	18.50 to 19.50
No. 2 southern, Cleveland	19.50 to 20.00
No. 2 southern, New York docks	18.50 to 19.00
No. 2 southern, Boston docks	18.75 to 19.25
No. 2 south. interior, New Eng.	19.50 to 20.50
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X furnace	18.00
Virginia No. 2X, Philadelphia	20.75
Virginia, No. 2X, Jersey City	21.50
Virginia 2X, Boston points	21.75
Gray forge, eastern Pa.	19.25 to 19.75
Gray forge, Pittsburgh	20.45
Gray forge, Birmingham	14.00
Silveries, 8 per cent, furnace	27.00 to 27.50
Silveries, 8 per cent, Chicago	29.50 to 30.50
Low phos. Standard, Phila.	37.00 to 40.00
Low phos. Lebanon, Pa., furnace	32.00 to 35.00
Low phos., Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	20.75 to 22.75
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bes., 51½ per cent, ton.	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	9.0c to 9.50c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	nominal
For'n non-Bess., 50 to 65 per cent	nominal

COKE

(At the ovens.)

Connellsville furnace	$5.00 to 5.25
Connellsville fur., contract	3.25 to 3.50
Connellsville foundry, contract	4.50
Connellsville foundry	4.50
Wise county furnace, contract	3.25 to 3.75
Wise county foundry, contract	3.75 to 4.25
Pocahontas foundry, contract	3.75 to 4.25
Pocahontas furnace, contract	3.25 to 3.75
New River foundry, contract	4.25 to 4.75
New River furnace, contract	3.50 to 4.00

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, or delivered prompt.	$162 to 165
Ferro manganese, 80 per cent, seaboard, or delivered, contract	162 to 165
Spiegel, 20 per cent, fur. early and last half	40.00 to 45.00
Ferro-silicon, 50 per cent, Pbg.	98.00 to 100.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $30.00; 10 to 11 per cent, $31.00; 11 to 12 per cent, $32.00; 12 to 13 per cent, $33.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$48.00 to 50.00
Forging billets, Phila.	65.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	55.00 to 60.00
Bessemer billets, Youngstown	45.00 to 50.00
Bessemer billets, Pittsburgh	45.00 to 50.00
Open hearth billets, Pittsburgh.	45.00 to 50.00
Open hearth billets, Youngstown	45.00 to 50.00
Bess. sheet bars, Youngstown	45.00 to 50.00
Op. h'th sheet bars, Youngstown	45.00 to 50.00
Bess. sheet bars, Pittsburgh	45.00 to 50.00
Open hearth sheet bars, Pbgh.	45.00 to 50.00
Muck bars, Pittsburgh (nominal)	45.00

SKELP

Grooved steel skelp	2.60c
Sheared steel skelp	3.00c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh & Chgo.	$33.00
Stan. op-h'th rails, Pbg & Chgo.	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh.	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c to 2.50c
Angle bars, st. sections, Chgo.	2.25c to 2.75c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	4.00c to 4.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pbgh.	2.70c
Structural shapes, Philadelphia	2.859c to 3.009c
Structural shapes, Chgo.	2.79c to 3.50c
Structural shapes, New York	2.869c to 3.019c
Tank plates, Chgo.	3.19c to 3.60c
Tank plates, Pittsburgh (con.)	3.00c to 3.25c
Tank Plates, Pittsburgh	3.25c to 4.00c
Tank plates, Philadelphia	3.659c to 4.159c
Tank plates, New York	3.669c to 4.169c
Bars, soft steel, Chicago	2.79c to 3.50c
Bars, soft steel, Pbgh.	2.60c to 2.70c
Bars, soft steel, New York	2.769c
Bars, soft steel, Philadelphia	2.759c
Hoops, carloads, Pittsburgh	3.00c
Bands, Pittsburgh	2.60c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chgo.	2.35c
Bar iron, Philadelphia	2.559c to 2.659c
Bar iron, Cleveland	2.55c
Bar iron, New York	2.569c to 2.669c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard Bess. steel bars, Chgo.	2.50c

SHEETS

(In cents per pound.)

(Open hearth material takes 10c above prices of bessemer.)

SHEET MILL BLACK.

Gage.	Bessemer.
17 to 21	3.20
22 to 24	3.25
25 and 26	3.30
27	3.35
28	3.40
29	3.45
30	3.55

TIN MILL BLACK

Gage.	Bessemer.
15 and 16	3.20
17 to 21	3.25
22 to 24	3.30
25 to 27	3.35
28	3.40
29 and 30	3.45
30½ and 31	3.50

GALVANIZED.

Gage.	Bessemer.
10 and 11	3.50
12 to 14	3.60
15 and 16	3.75
17 to 21	3.90
22 to 24	4.05
25 and 26	4.20
27	4.35
28	4.50
29	4.70
30	4.90

BLUE ANNEALED.

Gage.	Bessemer.
3 to 12	3.25
13 and 14	3.10
15 and 16	3.15

No. 28, black, Chicago	3.29c to 3.39c
No. 28 galvanized, Chicago	4.59c
No. 10, blue annealed, Phila.	3.159c to 3.419c
No. 10, blue annealed, Chgo.	3.19c to 3.29c

TIN PLATE

Tin plate, 100 lb., coke base	5.75c to 6.00c
Terne plate	4.90c

IRON AND STEEL PIPE

(Prices Adopted July 24, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	62	35½
½ in.	66	51½
¾ to 3 in.	69	55½
Lap weld:—		
2 in.	63	50½
2½ to 6 in.	66	53½
7 to 12 in.	63	49½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	51	24
⅜ in.	52	25
½ in.	56	38
¾ to 1½ in.	59	43
Lap weld:—		
1¼ in.	46	31
1½ in.	52	38
2 in.	53	39
2½ to 4 in.	55	42
4½ to 6 in.	55	42
7 to 12 in.	54	41

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	54
Iron, 3½ to 4½ inches, l. c. l.	44

IRON AND STEEL PRICES

Corrected up to Tuesday noon

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.60
Plain wire, jobbers', Pittsburgh	2.55
Galvanized wire, jobbers', Pbgh	3.25
Polished staples, Pbgh	2.75
Galvanized staples, Pbgh	3.45
Barb wire, painted, jobbers' Pbgh.	2.75
Barb wire, galv., jobbers', Pbgh	3.45

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ½ x 6 inches, smaller or shorter, rolled thread, 50 and 5, cut threads, 40, 10 and 2½, larger or longer, 35 and 2½.

Machine bolts with hot pressed nuts ½ x 4 inches, smaller or shorter rolled 50, and 10; cut, 50; larger or longer, 40 and 5.

Cold pressed, semi-finished hexagon nuts, 60 and 5.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.70 off list; hot pressed hexagon blank or tapped, $2.70.

Cold pressed square, blank or tapped, $2.40 off; hexagon, blank or tapped, all sizes, $2.80.

RIVETS

Structural rivets, Pbgh	4.00c
Structural rivets, Chgo. delivery	4.25c
Boiler rivets, Pbgh	4.10c
Boiler rivets, Chgo. delivery	4.35c

Tinner's rivets, 45, 10 and 5 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	2.60c to 2.70c

STANDARD STEEL CHAIN

Chain, ½ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

CAST IRON WATER PIPE

Four-inch, Chicago	$34.50 to 35.00
Six-inch and larger, Chicago	31.50 to 32.00
Six-inch Class B, New York	31.50
Four-inch Class B, New York	34.50
Four and six-inch Birmingham	29.00
Six-inch and larger, Birmingham	26.00

Leight weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.25c
Steel squares, 2-in. & ov., Cleve.	3.90c
Steel rounds, 2-in. & ov., Cleve.	3.90c
Steel bars, under 2 in., Cleveland	3.40c
Steel bars, Detroit	3.25c
Steel bars, Philadelphia	3.25c
Steel bars, New York	3.35c
Steel bars, St. Louis	3.30c
Steel bars, Cincinnati	3.35c to 3.90c
Steel bars, St. Paul	3.38c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.35c
Iron bars, Detroit	3.20c to 3.25c
Iron bars, St. Louis	3.20c to 3.25c
Iron bars, Cincinnati	3.35c to 3.90c
Iron bars, Philadelphia	3.25c
Iron bars, New York	3.35c
Shapes, Chicago	3.25c
Shapes, Detroit	3.25c
Shapes, St. Louis	3.30c
Shapes, St. Paul	3.35c
Shapes, New York	3.35c
Shapes, Cleveland	3.40c
Shapes, Philadelphia	3.25c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.35c to 3.50c
Plates, Chicago	3.75c
Plates, Detroit	3.75c to 4.00c
Plates, St. Louis	3.80c
Plates, St. Paul	3.85c
Plates, New York	4.00c to 4.50c
Plates, Cleveland	3.80c
Plates, Philadelphia	4.00c to 4.50c
No. 10 blue anl. sheets, Chicago	3.50c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.55c
No. 10 blue anl. sheets, Cinci.	3.50c
No. 10 blue anl. sheets, St. Paul	3.60c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chicago	3.55c
No. 28 black sheets, Cleveland	3.40c
No. 28 black sheets, Cincinnati	3.40c
No. 28 black sheets, Detroit	3.40c to 3.50c
No. 28 black sheets, St. Louis	3.65c to 3.70c
No. 28 black sheets, St. Paul	3.65c
No. 28 galv. sheets, Chicago	4.65c to 4.75c
No. 28 galv. sheets, Cleveland	4.40c to 4.75c
No. 28 galv. sheets, Cincinnati	4.50c to 5.00c
No. 28 galv. sheets, Detroit	5.00c
No. 28 galv. sheets, St. Louis	5.05c to 5.15c
Hoops, Cleveland	4.00c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.30
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$21.25 to 21.75
Angle bars, steel, St. Louis	16.00 to 16.25
Arch bars and transoms, Chgo.	23.00 to 23.50
Arch bars and transoms, St. L.	23.00 to 23.50
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	11.50 to 12.00
Boiler punchings, Chicago	13.50 to 14.00
Bundled sheet, Cincinnati	8.50 to 9.00
Busheling, No. 1, Chicago	14.25 to 14.75
Busheling No. 1, Cincinnati	11.50 to 12.00
Busheling, No. 1, Cleveland	13.50 to 13.75
Busheling, No. 1, St. Louis	14.50 to 15.00
Busheling, No. 2, Chicago	9.75 to 10.25
Cast borings, Chicago	7.25 to 7.75
Cast borings, Cincinnati	4.75 to 5.25
Cast borings, Cleveland	6.50 to 6.75
Cast borings, St. Louis	7.50 to 7.75
Cast, No. 1, Chicago	13.00 to 13.50
Cast, No. 1, Cincinnati	12.00 to 12.50
Cast, No. 1, Cleveland	13.50 to 13.75
Cast, No. 1, St. Louis	13.00 to 13.50

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	16.75 to 17.25
Iron axles, St. Louis	33.50 to 34.00
Iron axles, Cleve.	34.00 to 35.00
Knuckles, coup., Chicago	16.50 to 17.00
Knuckles, coup., St. Louis	17.25 to 17.75
Locomotive tires, Chicago	23.50 to 24.00
Locomotive tires, St. Louis	23.50 to 24.00
Machine shop turnings, Chgo.	6.00 to 6.50
Machine shop turnings, Cleve.	5.25 to 5.75
Machine shop turn'gs, Cincinnati	5.25 to 5.75
Machine shop turnings, St. L.	6.50 to 6.75
Malleable agricultural, Chgo.	11.00 to 11.50
Malleable agricultural, St. Louis	12.50 to 13.00
Malleable, Cincinnati	8.75 to 9.25
Malleable railroad, Chicago	12.50 to 13.00
Malleable railroad, St. Louis	13.00 to 13.50
Pipes and flues, Cleveland	12.00 to 12.50
Pipes and flues, Chgo.	12.75 to 13.25
Pipes and flues, St. Louis	13.25 to 13.75
Railroad wrought, No. 1, Chgo.	17.50 to 18.00
Railroad wrought, No. 1, Cleve.	17.00 to 17.50
Railroad wrought, No. 1, St. L.	18.00 to 18.50
Railroad wrought, No. 1, Cinci.	14.00 to 14.50
Railroad wrought, No. 2, Chgo.	16.75 to 17.25
Railroad wrought, No. 2, St. L.	17.00 to 17.50
Shafting, St. Louis	21.50 to 22.00
Springs, Chicago	16.75 to 17.25
Steel car axles, St. Louis	37.00 to 38.00
Steel car axles, Chicago	34.00 to 35.00
Stove plate, Chicago	10.00 to 10.50
Stove plate, Cleveland	10.75 to 11.00
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Cincinnati	8.25 to 8.75
Stove plates, St. Louis	11.50 to 12.00

(Gross tons.)

Axle turnings, Cleveland	$11.25 to 11.50
Busheling, No. 1, Buffalo	14.00 to 14.50
Busheling, No. 1, Pittsburgh	13.50 to 14.00
Busheling, No. 2, Buffalo	11.50 to 12.00
Bundled sheets, Pittsburgh	12.00 to 12.50
Bundled sheets, Cleveland	11.25 to 11.50
Bundled sheets, Buffalo	11.50 to 12.00
Car wheels, (iron), Pittsburgh	14.75 to 15.25
Car wheels (steel), Pittsburgh	18.50 to 19.00
Car wheels, Chicago	12.25 to 12.75
Car wheels, eastern Pa.	15.50 to 16.00
Car wheels, Buffalo	15.50 to 16.00
Car wheels, New York	13.50 to 13.75
Car wheels, St. Louis	12.75 to 13.00
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	9.50 to 10.00
Cast borings, New York	7.00 to 7.50
Cast borings, eastern Pa.	10.00 to 10.50
Cast borings, Buffalo	7.50 to 7.75
Cast borings, Pittsburgh	8.50 to 9.00
Cast, No. 1, eastern Pa.	16.00 to 16.50
Cast, No. 1, Pittsburgh	15.25 to 15.50
Cast, No. 1, Birmingham	11.00 to 11.50
Cast, heavy No. 1, N. J. points	16.00 to 16.50
Forge, No. 1, eastern Pa.	12.00 to 12.50
Frogs, switches, guards, St. L.	17.75 to 18.25
Grate bars, Buffalo	11.50 to 12.00
Grate bars, N. J. points	12.00 to 12.25
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pittsburgh	18.00 to 19.00
Heavy melting steel, Buffalo	17.00 to 17.50
Heavy melting steel, Chicago	16.50 to 17.00
Heavy melting steel, Cleveland	17.00 to 17.50
Heavy melting steel, Cincinnati	15.00 to 15.50
Heavy melting steel, eastern Pa.	16.00 to 16.50
Heavy melting steel, New York	14.00 to 14.50
Heavy melting steel, St. L.	18.25 to 18.75
Heavy melting steel, B'ham	11.00 to 11.50
Iron rails, Chicago	21.50 to 22.00
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	17.50 to 18.00
Iron rails, St. Louis	19.50 to 20.00
Iron rails, Cleveland	20.00
Iron axles, Pittsburgh	32.00 to 35.00
Iron axles, Cincinnati	23.00 to 23.50
Iron axles, eastern Pa.	30.00 to 32.00
Iron axles, Chicago	35.00 to 36.00
Iron axles, Buffalo	32.00 to 33.00
Low phos. steel, Buffalo	21.50 to 22.00
Low phos. steel, Pittsburgh	21.50 to 22.50
Low phos. steel, eastern Pa.	22.50 to 23.50
Machine shop turnings, Buffalo	6.00 to 6.50
Mch. shop turnings, New York	6.75 to 7.25
Mch. shop turnings, Pittsburgh	7.50 to 8.00
Mch. shop turnings, eastern Pa.	8.00 to 8.50
Mch. shop turnings, Birmingham	6.50 to 7.00
Malleable railroad, Cleveland	15.00 to 15.50
Malleable railroad, Buffalo	15.50 to 16.00
Malleable railroad, Pittsburgh	15.50 to 15.75
Malleable railroad, eastern Pa.	13.00 to 13.50
R. R. and mch. cast, No. 1 Bfl.	16.50 to 17.00
R. R. wrought, No. 1, Buffalo	18.00 to 19.50
R. R. wrgt., No. 1, eastern Pa.	22.00 to 22.50
City wrought, New York	15.00 to 15.50
R. R. wrought, No. 1, Pbgh.	19.25 to 19.50
R. R. wrought, No. 1, B'ham	12.00 to 12.50
Reroll. rails, 5 ft. & ov., Pbgh.	18.50 to 19.50
Reroll. rails, 5 ft. & ov., Chgo.	19.00 to 19.50
Reroll. rails, 5 ft. & ov., E. Pa.	19.00 to 20.00
Reroll. rails, 5 ft. & ov., St. L.	20.00 to 21.00
Shafting, New York	19.00 to 19.50
Shafting, eastern Pa.	21.00 to 22.00
Shoveling steel, Chicago	16.00 to 16.50
Shoveling steel, St. Louis	17.00 to 17.50
Steel rails, short, Chicago	18.50 to 19.00
Steel rails, short, Cleveland	19.00
Steel rails, over 6 ft. Cleveland	16.50
Steel rails, old, B'ham	12.00 to 12.50
Steel rails, short, St. Louis	19.50 to 20.00
Steel car axles, Birmingham	26.00 to 27.00
Steel car axles, New York	32.00 to 33.00
Steel car axles, Buffalo	32.00 to 33.00
Steel car axles, Cleveland	38.00 to 39.00
Steel car axles, Pittsburgh	32.00 to 35.00
Steel car axles, eastern Pa.	30.00 to 32.00
Stove plate, N. J. points	12.25 to 12.75
Stove plate, Birmingham	9.00 to 9.25
Stove plate, Pittsburgh	11.00 to 11.25
Stove plate, eastern Pa.	13.50 to 14.00
Wrought pipe, New York	13.75 to 14.00
Wrought pipe, eastern Pa.	16.00 to 16.50
Wrought pipe, Buffalo	13.00 to 13.50

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ANTIMONY OXIDES.
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BANDS. (Steel.)
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BARS—ALLOY.
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Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
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Inland Steel Co., Chicago, Ill.
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American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Company, Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
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Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
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Carnegie Steel Co., Pittsburgh, Pa.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
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BEARINGS. (Ball.)
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BELT CEMENT AND DRESSING.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

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Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

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Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

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Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

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Hydraulic Press Mfg. Co., Mt. Gilead, O.
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Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

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Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE TUYERES.
Keystone Bronze Co., Pittsburgh, Pa.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOOMS.
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Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

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